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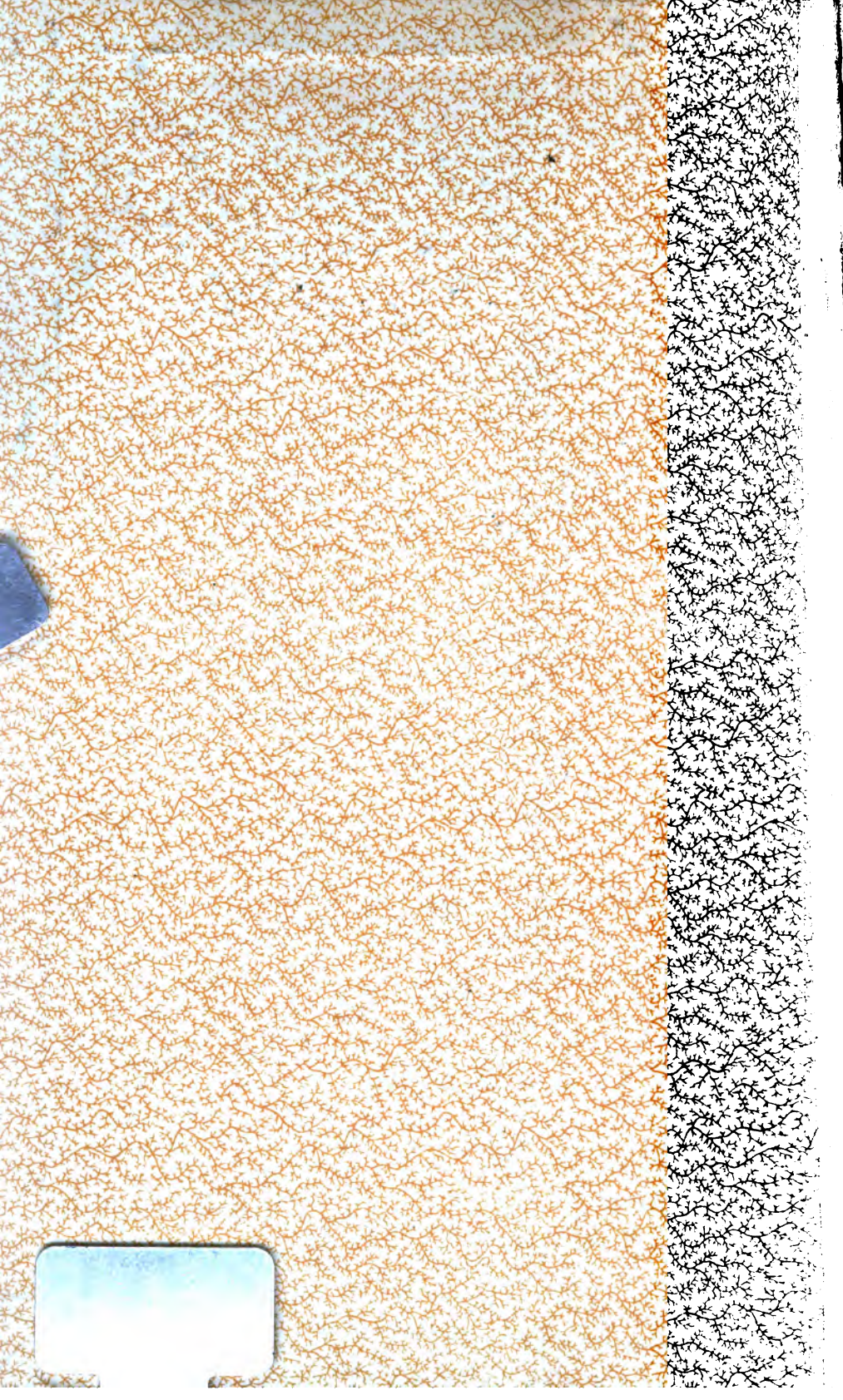
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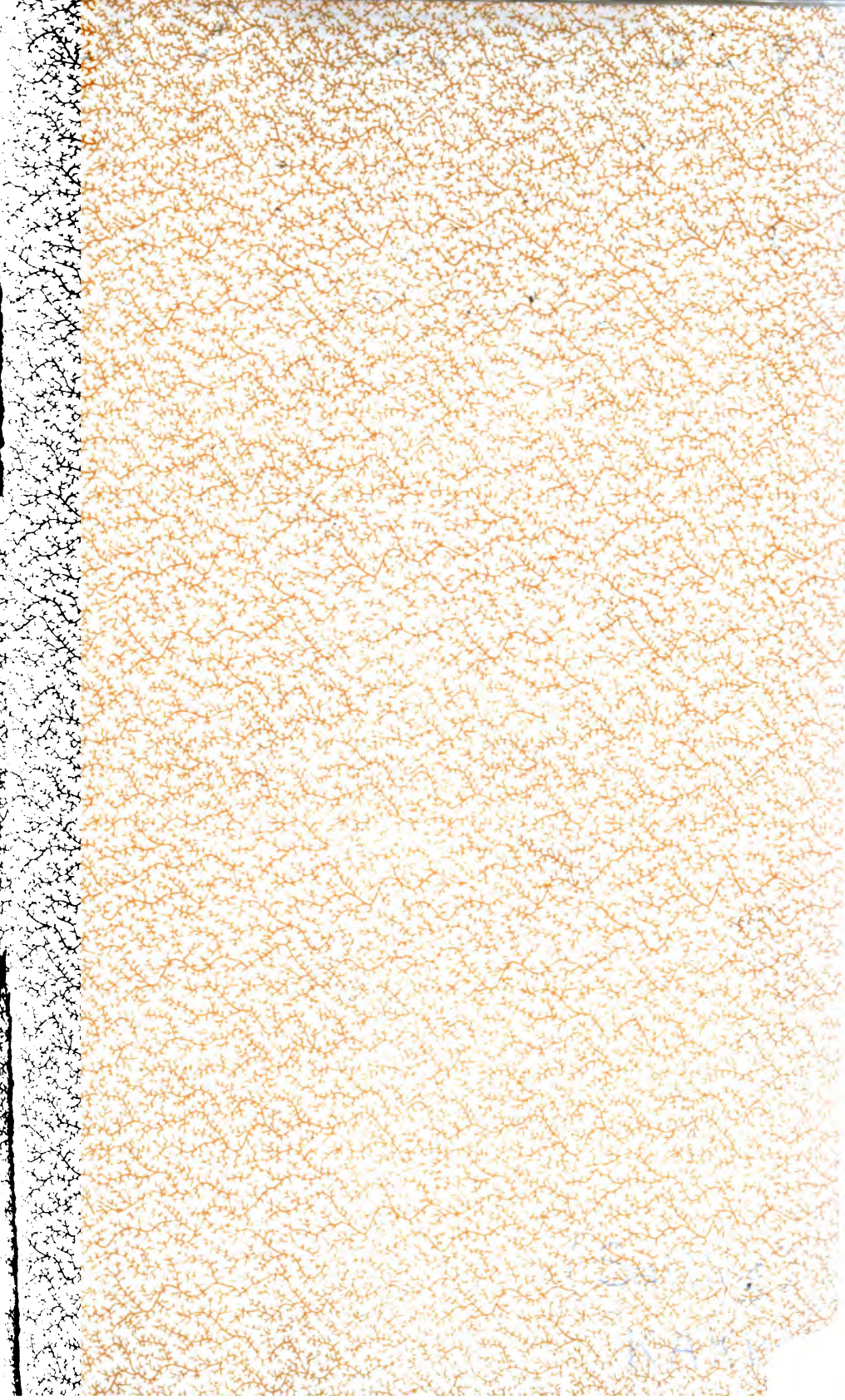
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# SAILING DIRECTIONS

FOR THE

# COAST OF BRAZIL ✓

INCLUDED BETWEEN

MARANHAO AND RIO JANEIRO.

COMPILED CHIEFLY FROM THE SURVEYS MADE BY BARON ROUSSIN  
AND M. MOUCHEZ OF THE FRENCH NAVY.

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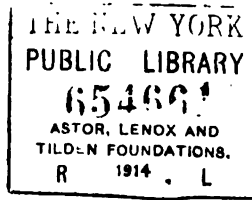
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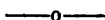
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ROY W. B.  
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Y. B. B.

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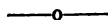
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The following is a complete List of Lights shown at this date, February 1st, 1875, within the limits of the Navigation described in this work. As a full description of them is given in the pages mentioned, it is unnecessary to add more detailed particulars:—

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## ADDENDA.

**PERNAMBUCO**,—The buoy marking the northern end of **English bank** is now *black* and that guarding the south edge is *red* as heretofore. Page 15.

# SAILING DIRECTIONS

## FOR THE

# COAST OF BRAZIL.

INCLUDED BETWEEN

## MARANHÃO AND RIO JANEIRO.

\*\*\* *The Bearings and Courses throughout this Work are Magnetic, unless otherwise expressed. The Variation at present (1875) is as follows:—*

*Maranhao*  $4\frac{1}{2}^{\circ}$  W.

*Ceara*  $9\frac{1}{2}^{\circ}$  W.

*Cape San Roque*  $12^{\circ}$  W.

*Las Roccas*  $13^{\circ}$  W.

*Fernando Noronho*  $14^{\circ}$  W.

*Pernambuco*  $11\frac{1}{2}^{\circ}$  W.

*Bahia*  $8^{\circ}$  W.

*Abrolhos Islets*  $6^{\circ}$  W.

*Cape Frio*  $4^{\circ}$  W.

*Rio Janeiro*  $3^{\circ}$  W.

*The average annual increase is probably about 6 minutes.*

*The Distances are in Nautical Miles,—60 to a Degree of Latitude. A Cable is considered to be  $\frac{1}{10}$  of a Nautical Mile, and equal to 100 Fathoms. The Nautical Mile is about 6,086 English feet, usually reckoned as 6,000=2,000 yards=1,000 fathoms; also the Nautical Mile=1,855 mètres=1·855 kilomètres.\**

*The depths are those at low water spring tides.*

## GENERAL REMARKS.

THE following general remarks on the appearance of the coast of Brazil, and the soundings met with when approaching the land, are extracted from Baron Roussin's *Pilote du Brésil*. The description begins with the southern part of

A Nautical mile is 6086·424 feet, using Bessel's measurement of the Globe. It is sometimes erroneously called a "Minute." It must not be mistaken for a Minute of Latitude, although it closely coincides with it. A Minute of Latitude, that is, a Minute of the Arc of a Meridian, is of variable length, increasing from the Equator to the Poles, being, according to Bessel's measurement, 6045·83 feet at the Equator, 6076·1 feet in latitude  $45^{\circ}$ , 6083·33 feet in latitude  $52^{\circ}$ , and 6106·6 feet at the Poles.

the country, and proceeds from south to north as far as cape St. Roque, whence it continues along the north coast to Maranhão.

The appearance of the coast of Brazil is not the same throughout the whole of its extent. From Santa Catharina island to about 60 leagues northward of cape Frio, the land is covered with forests, and is so lofty that it may be seen in clear weather fully 50 miles off; it consequently requires only common precaution in approaching. This remark does not, however, apply to other parts of the country, because in many places the land can be seen only at a short distance off, and should not, therefore, be approached with the same confidence; such are the parts between Espiritu Santo and Mount Pascoal, between Porto Seguro and Bahia, between the Torre Garcia d'Avilar and cape San Agostinho, and afterwards almost without exception from Olinda to Maranhão. In these places the land is low or of moderate elevation, and it is only occasionally that mountains are seen—generally of an inferior order, or situated too far in the country to be visible far off at sea.

**Eastern Coast.**—The indication of the vicinity of the coast given by the soundings depends very much upon the position the vessel may be in with respect to the land. Generally along the eastern coast from Santa Catharina island to Olinda, the soundings give but imperfect information, on account of their great depth near the shore, and should not, therefore, be much relied on. The parallel of the Abrolhos is, however, an exception; for, as subsequently noticed, the depths in the vicinity of and outside those islets are very irregular.

The depth at 18 leagues from the land, on the parallel of Santa Catharina, is 70 fathoms; at 12 leagues from Parangua, 40 fathoms; at 12 leagues eastward of San Sebastião island, 50 fathoms; at only 5 leagues south-eastward of point Joatinga, 35 fathoms; at 18 leagues S.E. of the entrance to Rio Janeiro, 78 fathoms; and at not more than 7 leagues from cape Frio, 60 fathoms. On a Spanish chart of 1777, are placed several soundings of 20 fathoms, at 10 or 12 leagues S.S.E. from this cape; but Baron Roussin was unable to find such depths.

The depth north-eastward of cape Frio is not less than that just described, and not less than 120 fathoms at 30 leagues E. by S. from cape San Thome. The bank of soundings extends further out East and S.E. of the Abrolhos,—though but little to the eastward of the meridian of  $37^{\circ} 20'$  W., or 25 leagues east of these islets. If such depths should be found about this meridian, in the parallel of the Abrolhos, it can only be accidentally, for one can rarely reckon upon having a less depth than 100 fathoms.

When only 8 leagues S.E. of cape San Antonio the bottom cannot be reached with a line 200 fathoms long, nor can it be reached at only 12 miles to the southward of that cape; although at about 4 miles more to the westward and northward the depth is only 20 fathoms. At the distance of 9 leagues, upon the parallel (and in sight to the eastward) of the Morro St. Paulo, there is no bottom, sounding in 120 fathoms.

From Bahia to Olinda the coast is not less steep. At 9 leagues eastward of Torre Garcia d'Avilar the depth is 180 fathoms; at a similar distance eastward of the bar of Itapicuru, it is more than 200 fathoms; at 20 leagues from the Rio Real and Rio Sergipe the depth exceeds 190 fathoms; at 10 leagues eastward of the entrance to the Rio San Francisco it is 50 fathoms; and throughout all the coast, until very near to Pernambuco, the depth is not less than 30 or 40 fathoms at the distance of 9 or 10 leagues from the coast; while at double that distance,

upon the parallel of Pernambuco and Olinda, the bottom will not be found with a line of 120 fathoms.

On the coast northward of Olinda the depth is comparatively less; but yet it is too deep, at a short distance from the shore, to be considered an easy or safe guide in making the land. Although the depth is 6 to 9 fathoms at only 2 or 3 miles from cape Branco before the mouth of the Rio Parahyba, before the fort Dos Reis Magos, at the mouth of the Potangi, as well as at 4 miles from cape St. Roque, yet the lead will suddenly drop into 40 fathoms at the distance of 10 or 12 miles from the shore.

**Northern Coast.**—Northward of the elbow formed by the land near cape St. Roque, the coast, which runs in the direction of W.N.W. so far as Maranhão, is very low, and composed almost without exception of sand-downs, indicating that shallow water is in its vicinity. This is fully borne out by the moderate depth at a considerable distance from the shore, all the way from the cape to Maranhão.

From Monte Melancia, in longitude  $39^{\circ} 20'$ , to the village of Almufedas, the depth is only 15 fathoms at the distance of 12 or 15 leagues from the shore, the bottom shoaling gradually towards the land. A little more water will be found at the anchorage about 3 miles northward of Ceara; but the depth diminishes a little in going to the westward, so that in general it will not be more than 10 fathoms at the distance of 10 or 12 miles from the coast.

Between Almufedas and Jericoacoara, and opposite the little village of Caracu, is an extent of coast to which large vessels ought not to approach nearer than 10 miles; this is in order that they may go clear of the bank of Caracu, upon which are only from 4 to 25 feet water, over an extent of 3 leagues from north to south. Having passed this danger, the depth increases, and vessels may approach within 5 or 6 miles of the land, although the soundings continue somewhat shallow until the meridian of Maranhão be attained; at one to 20 leagues from the land the depth is only 4 to 30 fathoms, consequently the soundings indicate very accurately an approach to the coast.

Such, then, is the difference which characterizes the eastern and northern coasts of Brazil; and it will be seen, on a careful consideration of what has been said, that on the greatest part of the eastern coast, from Santa Catharina island to cape St. Roque, the depth at a distance from land is generally too great to afford sufficient data for correcting a ship's reckoning.

If the voyage be computed at 15 or 20 days, and the vessel sail from a point situated to the eastward, it is very probable that her reckoning will be out more than 30 leagues, and she will be thus far to the westward of her account; and as the soundings cannot be depended upon as regular or conclusive at 30 leagues from the east coast of Brazil, other precautions must be taken to ascertain the vessel's exact situation. Still, shipmasters should not conclude that it is useless to sound on an approach to the land, but only that they must not place too much dependence upon the depths obtained; and we make a similar remark respecting the north coast, where, although the depths are less at a like distance, they are generally too irregular to be implicitly relied on.

The coast of Brazil, from Santa Catharina island to Maranhão, presents a peculiarity which is worthy of remark; for it appears as though it were encircled by two bands of elevated ground (*cintures de haut-fonds*), which, except in a few intervals, are continued throughout all its extent, and seem as if intended to defend the land from the encroachment and impetuosity of the waves, which continually lash the shores. One of these defences adjacent to the land is a ridge of

rocks, which forms a kind of border, extending principally from cape Frio to Maranhão. The other natural bulwark or defence of the coast is a bank, situated from 2 to 10 leagues from the land, generally of a moderate though irregular depth, which the natives term *Pracel* or *Paracel*, as all the depths are unequal and irregular where the inhabitants fish. It may be said that this *Pracel*, the same as the *recife*, is not covered throughout the whole of its extent; for the islands Figo, Castello, and Quemada, the Alcatraz (surrounded by rocks), the Abrolhos, the rocks of Manoel Luis, and their adjacent dangers, although considerably distant from the land, seem to be so many parts belonging to the same bank of soundings, and are composed everywhere of the same kind of rock. All these points are, besides, almost without exception, connected by a bottom of the same nature, the unevenness of which effectually breaks off the sea, although the depth is in every part sufficient for shipping, and nowhere impedes the navigation. Perhaps the existence of this ridge, immediately fronting the coast, is to be attributed partly to the surf and constant breakings of the sea upon the shore.

## CAPE ST. ROQUE TO PERNAMBUCO.

**CAPE ST. ROQUE** is in latitude  $5^{\circ} 28' 17''$  S., and longitude  $35^{\circ} 17' 17''$  W. It does not present anything remarkable in its appearance, as it is only a sand down, similar to the coast to the northward and southward of it; the sand is white, and has a few scattered bushes about it. Occasionally a small part of the coast, appearing steep and of a reddish colour, may be distinguished, but only when the sun shines upon it in a particular direction; a little to the southward of the cape there are or were a few large trees upon the shore, which are the more remarkable, as there are not any on the preceding part of the coast.\*

Northward of cape St. Roque the land sinks by degrees, and forms, at the distance of 8 miles, the low point of Petitinga. This point is not more remarkable than the cape, and there is only the difference of their latitudes by which it can be distinguished. The land between these points continues to be composed of white sandy downs, interspersed with bushes of a dark green colour, with here and there a few large trees on the top of the sand-hills, forming in round clusters, which are not easily made out unless from very near the shore. Bordering this part of the coast is the dangerous ridge of coral rock, named the *Recife*,† of which

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\* A large rock, resembling a hogshead in form, marks the extremity of cape St. Roque, and withstands the continual dashing of the waves. (*Mr. Kidder, 1845.*)

† The *Recife* is a singular ridge of coral, which extends along the coast at a short distance, and borders the shore more or less from Bahia to Maranhão. It seems as if it were intended to serve as a breakwater, to protect the land from the encroachments of the sea. Its surface is often even with the water at high tide, and sometimes from one to ten feet above it, but it is more generally covered. In it there are openings forming the entrances to the various harbours and rivers which intersect the coast, of which Pernambuco and Parahyba do Norte are instances.

the most elevated part, in latitude  $5^{\circ} 11'$  S., has obtained the name of Barreta de Garcas. These rocks are about 8 miles northward of point Petitinga, and it is said that there is good anchorage near them.

The first river to the southward of cape St. Roque is that of Searamirim or Cearámirim. The entrance is about 12 miles to the S.  $7^{\circ}$  E. from the cape, and we believe it is fronted by a bar, and is consequently not easily accessible, even by boats. It has been described as only a small rapid stream, having many windings; it is also said that it is dry except in the rainy season, and that it communicates with the Rio Grande do Norte. Statements have been made that it is not navigable in any part of its course.

**RIO GRANDE DO NORTE.**—This river is about a cable wide at its entrance, between points of the reef which border the coast; the depth in mid-channel is 2 to 6 fathoms. The entrance faces northward, and the southern reef has a round tower upon it named fort Dos Reis Magos, which is insulated at high water; this tower is sufficiently high to be seen several miles off, and is consequently one of the best marks for the river.

**Light:**—On the round tower of fort Dos Reis Magos a *fixed* light is exhibited, at 43 feet above the sea, visible 12 miles.

The town of Natal, some distance up the river, is but a small place, frequented by vessels of less than 150 tons burden. Vessels bound to it must carefully guard against the shoal ground immediately within the reefs at the entrance, after which the depth in mid-channel will be found to be 4 and 6 fathoms. At about  $2\frac{1}{2}$  miles from the fort Dos Reis Magos, there is a reef of  $3\frac{1}{2}$  fathoms in the middle of the river, nearly opposite the church and governor's house, which must, of course, be avoided by vessels working up.

The Rio Grande do Norte is not easy to enter, and should not be attempted by those unacquainted with its navigation. The bar being narrow, and the mouth of the river facing the north, renders it too difficult to be navigated by any vessels except such as may be in charge of a pilot. When within, the river is safe, the water being deep and quite still; but it soon becomes shallow, and in the course of a few miles diminishes greatly in depth and breadth. When the tide enters, the northern bank is overflowed to about a mile from the entrance.

In the event of a pilot not being obtainable, the following instructions (1830) may be of service. Keep the fort, on the main land within the entrance, open of the extremity of the southern reef, until the round fort on that reef is seen inside of it, bearing about S.  $\frac{1}{2}$  E.; then run in S.  $\frac{1}{2}$  W. till the fort on the main bears W.  $\frac{1}{2}$  S., when steer for it. When within two-thirds of a cable from this latter fort, proceed towards a white house on the same side, and then directly for the town, in mid-channel, keeping over to the eastern shore, as there is a shoal bank all the way up on the opposite side. It will be prudent to have the lead going when entering, and to back upon the first shoal cast.

Baron Roussin says of the Rio Grande do Norte in 1819,—"This river presents nothing remarkable by which its entrance can be discovered at a distance; but when 2 or 3 miles from it, the fort Dos Reis Magos will be observed, standing upon a low part of the coast at the southern point of its entrance. The river, according to the pilots, is a rapid and considerable stream during the rainy seasons, but in the dry season is very much reduced; and at all times its channel is much obstructed by sands and rocks; its entrance is therefore only accessible by small vessels. When it is high tide, the fort Dos Reis Magos is surrounded

by water. The windings of the river may properly be considered as the southern boundary of the Sertão.\*

Towards the sea, from the reef off the north point of the Rio Grande, there are some shoals above water which extend northward about a league; there are also many rocks scattered about.

**Natal** is a very old town, and a place of but little consequence; although in former times, at the time of the Dutch wars, it was considered of great importance; its fortress, then probably the strongest in Brazil, was well armed and defended, and was the chief protection to the town; it is now, however, in comparatively a ruinous state, but if repaired, might again be of service. The commerce is very inconsiderable, and at present, owing to the apathy of the inhabitants, seems little likely to improve.

The town was visited by Mr. Koster, in or about the year 1815, and was thus described by him.—“A foreigner who might chance to land first at the city of Natal, on his arrival upon the coast of Brazil, would form a very poor opinion of the state of the population of the country; for, if places like these are called cities, what must the towns and villages be? But such a judgment would not prove correct; for many villages, even of Brazil, surpass this city; the rank must have been given to it, not from what it was or is, but from the expectation of what it might be at some future period. The settlement upon rising ground, rather removed from the river, is properly the city, as the parish church is there; it consists of a square, with houses on each side, having a ground floor only; the churches, of which there are three, the palace, town hall, and prison. Three streets lead from it, which have also a few houses on each side. No part of the city is paved, although the sand is deep: on this account, indeed, a few of the inhabitants have raised a footpath of bricks before their houses. The place may contain 600 or 700 people.

The lower town is on the bank of the river; the houses stand along the southern bank, and there is only the usual width of a street between them and the river. This place may contain from 200 to 300 inhabitants, and here live the men of trade of the Rio Grande.”

**Ponta Negra.**—At about 18 miles southward from Rio Grande do Norte is Ponta Negra (Black point), which probably derives its name from several clusters of bushes, appearing of a dark green colour, in contrast with the white sand which constitutes the shore. At 2 or 3 miles to the north of this there are some red cliffs, known by the pilots as the *Barrieras de Inferno*, which extend in a northerly direction, at some distance from shore. A rivulet named *Conceicao*, or *Tareyry*, enters the sea at the foot of these cliffs, through an opening of the *Recife*, before which breakers extend to about a mile. Numerous fishing huts may be seen at the mouth of the rivulet, and also some small vessels in the inlet.

**Ponta Pipa.**—At about 11 miles southward of Ponta Negra is Ponta Pipa, which, according to Pimentel, consists of a rock on a point of land, of the shape of a wine-butt, upon which the sea breaks. A short distance southward of this rock, there are (or were) three springs of fresh water on the beach, where ships

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\* The Sertão is the desert country forming the north-east part of Brazil; it includes not only the interior of the country, but a great part of the coast, of which the population is very scanty.

may water when the tide is low. And, on the north side of the point is a large bay, in which vessels may anchor close to a white rock, where there is a depth of 6 or 7 fathoms water on good clear ground. Statements have been made that off this part of the shore, at the distance of 8 or 10 miles, there is a shoal of not less than 4 fathoms, which can readily be perceived by the sea breaking upon it. Over it, small vessels may probably pass in safety.\*

**Cunhahu River.**—At about 5 miles southward of Ponta Pipa, there is a small river named Cunhahu, which may be recognised by its white cliff. It is represented to have a depth of 8 fathoms on its bar, but this we consider uncertain. South of this river the coast bends a little to the eastward, and forms the Bahia Formosa (Fair bay), a term which has been very inappropriately applied to this part of the coast, for its dangerous character does not justify the appellation. It is said to have about 4 fathoms water in its middle, but not to be a safe anchorage on account of being open to the sea, and because of being filled with rocks and foul ground.\* The term Bahia Formosa has probably been given to the bay, because when viewed from the sea, it appears capable of affording shelter from E.S.E. round by south to N.W. The usual place of anchorage is opposite to the village in 7 fathoms water; this depth at the distance of about half a mile, increases to 9 fathoms, on ground not so rocky as that nearer the shore.

At about 15 miles southward of Bahia Formosa, the small river Camaratuba falls into the sea, and 7 miles beyond this is a projecting part of the coast forming on its south side an open bay named Bahia de Traiçao.

**Bahia de Traiçao.**—This bay has been variously described, some navigators considering it the best anchorage on the coast; but Baron Roussin says it affords no shelter from the winds from North eastward to South, and that the careful examination he made of it confirmed his opinion that it was only a small cove of no importance. It appears probable that a small stream once flowed into it. According to the Baron, this part of the coast terminates in a steep reddish peak, which continues on to a little chasm or opening in the reef, which forms the Bahia de Traiçao.

Pimentel says of Bahia de Traiçao,—"It is in the form of a half-moon, having a reef of rocks above water, running from its east point to nearly its centre. In this reef there are three openings or entrances, of which that to port has not more than  $1\frac{1}{2}$  fathoms water at its mouth; but the other two are capable of admitting large vessels, the middle one having a depth of  $4\frac{1}{2}$  and 5 fathoms, and its breadth between the end of the reef and a rock named Piçao being 120 fathoms. The third entrance, and largest of all, lies to the westward of the others, and is half a league in breadth; at its entrance, as well as within the bay, there are  $4\frac{1}{2}$ , 5, and 6 fathoms, so that the bay may receive 50 large ships at a time. Within the bay, and immediately fronting a river which falls into it, is a head of sand, about a cable from shore. The bay itself, likewise, is divided into two parts by a shore which runs from the land to the reef, and terminates on one side of the small bar, lying to the east of the other two; for which reason those who frequent the harbour should take care not to pass to the eastward of the middle of the bay."

In the vicinity of Bahia de Traiçao, the aspect of the coast changes, for the

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\* This shoal is not mentioned in Baron Roussin's chart, nor is it marked on any charts of the coast that we have seen.

land to the northward appears to be one continuation of white sand-hills (*dunes*) covered at intervals with bushes, among which may be seen a few clusters of cocoa trees, but no large trees such as are met with on the coast more to the southward. The jungadas,\* or boats of the natives, are very seldom seen on this part of the coast, and there are no habitations upon the low grounds; all tending to show the barrenness of the country, and the paucity of its inhabitants. It is about this latitude that the Sertao, or desert, commences, which, covering an immense space, nearly all barren, forms the northern part of Brazil.

At about 4 miles southward of Bahia de Traição, is the entrance to a small stream named Mamanguape. This river has many reefs about it, and only one channel by which a vessel may sail in; it is said, however, that within the reefs the water is very smooth, so that it might be a valuable anchorage if the depth was sufficient to admit large vessels, which unfortunately is not the case, as none but the small coasting vessels can enter; and these must be navigated with great care. Its southern point, the extremity of the low ground, is formed of sand and woods, is very low, and has extensive breakers running out from it in a N. by E. direction, which, in entering or going out of the river, must always be passed to the northward. A village stands on the northern point of the entrance, and will appear conspicuous on approaching the shore.

**RIO PARAHYBA.**—This river is a place of considerable trade; but only vessels of very light draught can ascend it as far as the town; a distance of about 18 miles. It is usual, therefore, for large vessels to anchor just within the entrance, off fort Cabedello. This fort, erected on point Matto or Balea, the eastern point of the river, may be seen from the offing, so that it serves as a mark of recognition for the low and even coast, which is destitute of other buildings.†

The land on both sides of the entrance to the river is low, consequently some care is requisite in making the coast from seaward.‡ Point Balea is low, sandy,

\* These boats are simply rafts of a peculiar species of light timber, lashed or pinned together; a large latine sail; a paddle used as a rudder; a sliding keel let down between the two centre logs; a seat for the steersman; and a long forked pole, upon which is hung the vessel containing water, provisions, &c. They present a strange appearance at sea, no hull being apparent even when near them. Usually two men are sufficient to manage them, and they are said to go closer to the wind than any description of ship.

† The entrance of the river Parahyba is not easily recognised by a stranger, since the principal mark given for it—the church of Santa Cruz—is now almost entirely hidden by the foliage of the trees with which it is surrounded, and the river running nearly parallel with the coast for some distance presents a delusive sameness in this vicinity. The fort of Cabedello (another mark) is also entirely hidden by the cocoa-nut trees until it has a southerly bearing, and then a vessel must be within three miles of the land, and within half a mile of broken water, before it can be distinctly made out; when as close as this, a pilot may be obtained.—(1864.)

‡ It seems probable that there is a rocky bank somewhere off the coast in the vicinity of the mouth of the river, as the *Edmond*, a French vessel belonging to the port of Havre, is stated to have struck on it. The bearings of the rock were not given, so it is impossible to say its exact situation, but the master reported it to be where 12 and 14 fathoms were marked on his chart. It appears that she was drifted by a strong current on to the coast, light winds and calms prevailing at the time; it was consequently found impossible to get the vessel off.

and woody, and has before it a dangerous reef, close to which there are about 6 fathoms water; this reef extends out nearly half a mile, and encloses between it and the shore a space of shallow water. The western point of entrance is a little more elevated, and has on it some cocoa-nut trees; behind it on a hill is the convent of Nossa Senhora da Guia, which is or was inhabited by the order of Santa Theresa. Fronting these points there are shoals which extend across the mouth of the river, and render access to it difficult for strangers. The depth outside these shoals at the distance of about a mile is represented to be about 7 to 6 fathoms.

The bar at the mouth of Parahyba river is extensive, and cannot safely be attempted but at high water, and then only under the conduct of a pilot, although it is buoyed. Vessels on entering must anchor at Cabedello and report at the Customs offices; whence, after due entry, an officer is sent on board to accompany the ship to Parahyba, which is 11 or 12 miles up the river, near the junction of the Sanhoa with the Rio Parahyba.

The river is tortuous, but the breadth is sufficient to permit of a handy vessel turning to windward, except in two of the reaches; in one of these the bottom is of stone, and so level that an anchor will not hold; the other is within sight of the city, and is so narrow that vessels have to warp through it if the wind be unfavourable.

The river is subject to tidal influences; and also to certain occasional irregularities in the depth of water, said to arise from the force and direction of the winds, which veer from South to E.N.E. and N.W. occasionally. Vessels loading at Parahyba if their draft of water exceeds 9 feet, will not lay afloat at all times of the tide, from which cause long vessels laying aground where shorter ones have previously lain are apt to strain; the bottom is said to be mud.

**Light.**—A lighthouse stands on Pedra Secca rocks, at the Cabedello bar, half a mile from point Matto, at the entrance of the river Parahyba. It exhibits a revolving white light, at 52 feet above the sea, visible 12 miles. Approximate position, lat. 6° 56' 30" S., long. 34° 49' W.

*In approaching the river from southward*, cape Branco, 12 miles south of fort Cabedello, is a useful mark, as it is a projecting headland. It consists of a steep cliffy shore of white sand, which may be distinguished edgewise when viewed in the direction of north or south, but blends with the adjoining coast when seen from the offing. At two or three miles from the land the depth is 7 or 8 fathoms water, bottom of sand, ooze, and coral. The coast hereabouts affords neither anchorage nor shelter. From off cape Branco, the country to the N.W. appears like two plains, which, on advancing, become distinctly marked. The outer one, near the sea, is low and sandy, but woody in the higher part; the inner plain presents a line of small wooded hills. The river Parahyba flows between these two plains, and its direction is S.S.W. from its mouth.

*In approaching the river from northward*, it is said that vessels may run along the coast until fort Cabedello comes in sight, when they will be off the banks at the entrance. It is strongly recommended to keep the lead going, so as not to get into a less depth than 7 or 6 fathoms. The entrance to the river between the shoals is not more than 3½ cables wide, and is fronted by a bar upon which there are only 6 to 8 feet water. As this bar is difficult, it should be crossed only with a pilot's assistance, and even then great care is requisite. The land breeze seldom blows.

The following remarks are by Commander de Roos (1832):—

"The river Parahyba do Norte carries on an extensive commerce, and is generally visited by ships homeward-bound from Pernambuco to complete their cargoes. Vessels drawing 16½ feet water can safely enter at springs.

Ships approaching from southward are recommended to make cape Branco, which is 12 miles south of Cabedello. It is a remarkable headland, with two cocoa-nut trees on its extreme point. From northward the latitude may be run down, when Cabedello fort will appear; this is the only fortress for many leagues upon the coast, which otherwise bears a great sameness of appearance. Ships should on no account venture into less than 6 fathoms water.

A gun fired will bring off a pilot; they come in 'jangadas' from the Cocoa village to the south of the fort, and are considered expert and trustworthy.

The bar is at some distance from the land, and, as the passage is tortuous, it is not safe to attempt to enter without a pilot.

The bottom is sand, in spots hard. There are breakers on either hand, and the marks which are given are difficult to distinguish, and therefore not to be depended upon.

The land winds are not of frequent occurrence. Vessels, therefore, have generally to beat out against the prevailing N.E. wind, which blows steadily.

It is usual for all ships entering to anchor off the fort Cabedello, in order to be visited: after this they are at liberty to proceed up the river.

A different pilot is appointed to take vessels up the river, which, as the wind is generally fair, is an operation of little difficulty and danger, and is almost always effected in one tide. The two shoalest spots are situated, one just above Cabedello, and the other abreast the entrance of Tambia river. Going down is tedious, as ships have beating winds, but the reaches are long. The bottom throughout is soft mud.

It is necessary to warp into the anchorage off the city, which is perfectly sheltered and secure. Indeed, the only vessel ever lost in the river was one which, by inadvertence, grounded upon her anchor, and foundered.

Water is to be procured by sending boats with casks up the river; that of the Tambia is celebrated for its purity. Provisions may be had in abundance, and at a very moderate rate."

The town of Parahyba is on the southern bank of the river, and contains about 3000 inhabitants. The principal street is broad and paved. The houses are mostly of one story, with the ground floors as shops, and some have glass windows. There are several churches and convents, also some public fountains. The prospects from the windows present Brazilian scenery of the best kind,—extensive and evergreen woods, bounded by a range of hills, and watered by several branches of the river, with here and there a whitewashed cottage upon their banks, half concealed by lofty trees.

The lower town consists of small houses; it is situated upon the borders of a spacious basin or lake, formed by the junction of three rivers, which thence discharge their waters into the sea by one considerable stream. The banks of the basin are covered with mangroves, as in all the salt-water rivers of this country. The lands of the Captaincy are rich and fertile, and the sugar is considered equal to the best in any other part of Brazil.

The river is very winding, and it is not navigable beyond the present anchorage. Canoes go up a long distance, although in the summer season the bed of the river becomes dry beyond 20 leagues. One of the finest buildings the town contains

is a *trapiche*, or government warehouse. Extending from the river, two streets contain the principal buildings and commercial establishments of the lower town. The streets are wide, and paved with a kind of clay slate, much worn.

The coast from the river Parahyba southward, as far as Olinda, is not well known; the following description of it is therefore imperfect.

**Porto Francez**:—At about 3 miles southward of cape Branco, there is said to be a small place named Porto Francez, where, the coasters assert, there is an indifferent anchorage formed by an opening in the reef under the chapel of Nossa Senhora da Penha, which chapel will serve as a mark by which vessels may recognise the land. The anchorage does not, we believe, belong to any river, and it is represented as suitable only to receive the small coasting vessels during fine weather. It is said that from this opening there is a passage within the reef that borders the coast even as far as the river Parahyba, and that the small coasting vessels frequently use it; the passage is, however, very shallow, and requires a knowledge of the locality to traverse it in safety.

Pimentel, the old Portuguese navigator, says,—“Porto Francez, or, as it was anciently called Pitimbú, has anchorage for 12 ships, but on very bad ground. The port is easily known, as it is surrounded by cliffs 40 to 50 feet high, which closely overhang the beach. In about the middle of the reefs between the port and cape Branco there is an opening of 4 fathoms water, named Pedra Furada (the Bored rock).”

**Goiana River**:—From cape Branco the coast trends southerly, and, like the coast to the northward of the cape, continues to be fronted by the reef. In latitude about  $7^{\circ} 32'$  is the river Capibarami or Goiana, the bar of which lies nearly midway between the two points named Coqueiros (Cocoa-tree point) and Ponta de Pedras (Rock point). It is said that vessels of 40 tons may proceed up the river to the town of S. Miguel de Goiana, which is seven leagues from the bar.\*

**ITAMARACA**.—This is an island 8 miles long, lying parallel with the shore, from which it is separated by a narrow channel. When seen from a distance it appears with two gaps or valleys, which apparently divide it into three parts; these appear more prominently when bearing West. Upon the southern of these there are (or were) two very large trees, and on its southern part there is (or was) a flagstaff, visible 6 or 7 miles. The island contains no stream of water, but in the neighbourhood of the town water gushes from the hills wherever it is dug for. There are sugar-mills, and the island is well stocked with negroes; and many planters have residences there. Besides the lands attached to these works, there are other considerable tracks, which are subdivided among persons of small property. The shores are thickly planted with cocoa-trees, and studded with huts belonging chiefly to the fishermen: interspersed with these are many white cottages, having a very respectable appearance. The salt-works on the island form a great source of its wealth; these are formed in the sands which the high tides overflow.†

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\* The reefs extend out from this part of the coast about 4 miles, consequently the land must be approached very cautiously, and a good look-out ought to be maintained. In February, 1856, the *Shooting Star* received serious damage by striking on the rocks at a place called Taquera, near Goiana, through venturing too near the shore. Fortunately she was able to get inside the reef, and was then run aground at half-tide.

† I proceeded along the southern shore of Itamaraca for about 2 miles, alternately in paths among the cabins and upon the hard white sand of the beach. The dwellings

Mr Koster says, in 1816, "Itamaraca is well peopled, and wooded. It contained years ago a very considerable town, named Nossa Senhora da Conceicao, which is now in ruins, being eclipsed by the neighbouring town of Goiana, situated on the mainland. Of its villages that named Pilar, on the eastern coast, is the most considerable; it is composed of several irregular streets, formed of small houses of various descriptions. This village is a place of considerable trade, being much frequented by the small craft which sail between Pernambuco and Goiana; it is also the seat of a fishery of importance.

The harbour of Itamaraca is good, and the entrance to it is protected by an old fort, now much out of repair. The entrance to the port is formed by an opening in the *recife* or reef of rocks which runs along the whole of this part of the coast. This opening is of considerable width, and its depth will admit large vessels; but exact information on the subject is wanting. From the mainland on one side, and from the island on the other, two long sand banks jut out on each side of the channel, which separates Itamaraca from the continent. These banks are dry at low water, and at neap-tides are not completely covered. They shoot out so far that they nearly reach the reef. The bar is easily discovered from the sea, as it is immediately opposite to the channel or river into which it leads, and as there are breakers to the northward and southward, but none are to be seen at the place which is to be entered. Having entered the bar, some small breakers will be seen ahead, or rather towards the south side of the channel, unless the tide is out, and then the water is quite still. These breakers are farther in than the outermost point of the south sand-bank. They are formed by some rocks which lie at a considerable depth below the water's edge. The passage for large vessels is between these rocks and the north sand-bank, for the passage between them and the south bank only admits of small craft. The anchorage ground is opposite the fort, and on the outside of it; but opposite to the town of Conception (Nossa Senhora de Conceicao), which is farther in than the fort, there is considerable depth of water. Some parts of the ground are rocky, but others afford safe riding.

Itamaraca appears to possess many advantages of which Recife (Pernambuco) cannot boast. The port of Itamaraca may not admit vessels of so much burden as the Poco harbour of Pernambuco, but the former is much more safe even than the Mosqueirao port. Besides this advantage, Itamaraca and the neighbouring shores of the mainland, enjoy those of wood and water in abundance, in the latter of which Recife is particularly deficient."

Of the passage between Itamaraca and the shore, and also of the approaches to it, our description is very imperfect: we therefore strongly recommend the masters of all vessels bound there to obtain the assistance of a pilot. The following, though not much to be relied on, will afford some information; it should, however, be remembered, that it was written some years ago:—

The principal entrance to the harbour of Itamaraca is to the southward of the island, by the outlet of the river Iguaracu, the bar of which is said to be sufficiently deep to allow vessels of 300 tons to pass, but this is uncertain. To cross this bar, vessels must have a fair wind, on account of the narrowness of the channel.

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extended, with more or less regularity, the whole distance; the day before I found them in the same manner, one and a half miles to the westward. Thus it may be said that the whole eastern shore of Itamaraca is covered with habitations, embowered in the shade of one continuous cocoa-grove. (*Mr. Kidder.*)

The course in is about W.S.W. between the reefs, which extend out, in some parts, as far as  $2\frac{1}{2}$  leagues, and great care is required in steering because there is not sufficient room to tack. The depth in mid-channel is stated to be 3 fathoms, and the rise of tide 7 to 9 feet. In the narrowest part of the stream there is a shoal of about 12 feet water, beyond which the water deepens, so that vessels may here anchor in safety, and ride in perfect security. The distance of the anchorage from the bar is about 3 miles.

The northern entrance to the channel between Itamaraca and the shore is too shallow to admit other than small craft, and even to vessels of that description its navigation is not unattended with danger. It is said that within the bar the channel deepens to 5 fathoms, and that it has on its northern side a flat rock of 9 feet water. Inside is the village of Catuama.

On the northern end of Itamaraca there is, or was, a fort, and on a small islet at its south-east end there is another. In running from the harbour, vessels are recommended to run out to sea on a N.E. by E. course until they have quite cleared the shoals, and got soundings of not less than 9 fathoms, after which they may steer for Pernambuco, or for a northern port.

Baron Roussin, when describing this part of the coast of Brazil, says:—

"The coast northward from point Olinda is perceptibly more elevated than that immediately to the southward; and this difference makes it easy to recognize the land fallen in with; for should it be point Olinda, the latter may be seen and known at the distance of 5 or 6 leagues. Point Olinda is not, as shown upon former charts the easternmost point of South America; for the most easterly land is that of point Guia, in lat.  $7^{\circ} 26' 25''$  S.

At 7 miles north of point Olinda, a little battery, named Pao Amarello, will be seen upon the mainland, erected, according to the pilots, to defend an opening in the reef, where vessels of 6 or 7 feet water can navigate at high tide up to Pernambuco, passing inside the reefs and banks of Olinda; this entrance is known as the Barra Amarello.

Seven or eight miles northward of this is another gap or opening in the shore, of somewhat more importance, where vessels drawing 7 feet water may enter, and anchor; this entrance, the river Iguaracu, is protected by a small fort.

All this part of the coast is composed of woody hills, cultivated, and separated from the sea by a low white sandy shore, at 2 to 3 miles from which the depth is 11 to 15 fathoms water, on a bottom of sand and gravel."\*

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\* In the Supplement to Baron Roussin's "Pilote du Brésil," edition 1845, there is an account of Itamaraca and of the river Ay (Iguaracu), of which the following is a translation:—

"Itamaraca island does not project from the general line of coast, and is separated from the main land only by a narrow stream of little depth, the water in which is influenced by the tides. It is comprised between the outlets of the rivers Iguaracu and Massaranduba, and a sort of natural canal which unites these rivers. The river Iguaracu takes towards its mouth the name of Ay, and the river Massaranduba is perhaps only a branch of the river Goiana. The waters of the river Ay flow into the sea by an outlet which is bounded on the N.W. by the S.E. coast of Itamaraca; and on the S.E. by the coral reef, which borders almost the whole of the coast of northern Brazil; this reef extends a considerable distance to the N.E. from the entrance to the river. When the *Bayadère* passed before the mouth of the river, no agitation or breaking of the sea indicated the presence of the reef, although the vessel certainly passed twice very close to its supposed limit; the first time, when she tacked in  $10\frac{1}{2}$  fathoms at about  $4\frac{1}{2}$  miles from the land in the

From Itamaraca the coast continues to have much the same direction to the southward, for a distance of about 16 miles to the port of Pernambuco.

## PERNAMBUCO TO BAHIA.

**Olinda Point and Light.**—In approaching Pernambuco from northward it is recommended to give the shore a wide berth, particularly about point Olinda, as dangerous reefs extend off that point about 2 miles, and are in some places steep-to. It is considered prudent not to approach the point nearer than three miles, and to keep the lead going, so as not to get into a less depth than 10 fathoms, as within that distance the soundings may be irregular.

A light is exhibited from the old fort of Montenegro on Olinda point. It is an *intermittent white* light, visible 10 miles. Position, lat.  $8^{\circ} 0' 50''$  S., long.  $34^{\circ} 50' 30''$  W.

**PERNAMBUCO:**—Pernambuco is one of the most important seaports of Brazil. Its harbour is formed by the *recife*, the singular coral reef which has been already mentioned as bordering the coast, with but few intervals, from Maranhão to about lat.  $14^{\circ}$  S. The harbour should properly be considered as divided into two parts, of which the exterior, called by the Brazilians *Poco* (or the *Well*), is an anchorage, situated at the head of the *recife*, to the northward or outside of the port. Its entrance is between some sunken rocks or detached coral banks, which are probably the continuation of the principal reef; this entrance is named the *Great Bar*, and there are generally about 17 feet upon it at low water, which increases to about 20 feet within it, at the part where vessels moor. The banks within are of sand, and the depth decreases as the land is approached. This anchorage, which affords no shelter against the winds blowing from seaward, except the sunken rocks at the entrance, is not tenable during the

direction of E.S.E. from fort Orange; and the second time, when she sounded in  $11\frac{1}{2}$  fathoms at  $5\frac{1}{2}$  miles E. by N. from the same fort. Some coasting vessels were at anchor under the fort, and the pilot, when consulted respecting the best means of attaining the anchorage, stated positively that there were no other dangers than those upon which the sea broke at a little distance from the land, between the *Bayadère* and the vessels at anchor. So positive an assertion, confirmed besides by the tranquil state of the sea outside these breakers, causes us to think that the extent of the reef marked on the charts is very exaggerated, and that the dangers at the entrance to the river are really comprised within the line of breakers.

"On January 4th, 1843, the *Vaillant Basque*, of Bordeaux, when a little to the northward of the entrance to the river Ay, was lost upon a rocky bank, estimated to be six or seven miles from the land. Of the existence of a rock hereabout there cannot, we think, be a question, although we have reason to believe that it is much nearer the coast than the above distance. We certainly can affirm that it lies within the route of the *Bayadère*, and consequently within  $5\frac{1}{2}$  miles of fort Orange, although we cannot say its exact situation, but think it to be in the direction of E. by N. from fort Orange. The rock was probably the northernmost of the covered dangers which limit towards the sea the channel leading into the port of Itamaraca."

South monsoon ; it is protected by forts Bruno and Buraco, which stand on the low land, at the distance of 1200 yards from each other.

The interior part of the port of Pernambuco, known as the *Port of the Recife*, is comprised between the quay of the rocks and the town, and is named *Mosqueirao*. In this port are 2 and 3 fathoms water ; but there is a bar of 7 to 12 feet, which vessels bound inwards will have to cross. This inner port is sheltered from the sea by the Recife, which is here 8 to 10 feet above the sea at half-flood.\*

**Picao Light** ;—A lighthouse stands on the reef 50 yards northward from fort Picao. It exhibits a *revolving* light, attaining its greatest brilliancy every minute and appearing twice *white* and once *red*, with eclipses of 5 seconds ; visible 15 miles. Position, lat.  $8^{\circ} 3' 42''$  S., long.  $34^{\circ} 51' 42''$  W.

**English Bank** :—Outside the harbour at the distance of about a mile E. by N. from the lighthouse there is a dangerous bank, named the English bank, upon the shoalest part of which there is said to be  $1\frac{1}{2}$  fathoms at low tide ; in 1850 it was stated that there was not sufficient water even at high tide to allow a vessel drawing more than 11 feet to cross. The length of the bank from north to south is about three-quarters of a mile, and its breadth is half a mile. The bottom is extremely rocky, and the soundings about the bank are also rocky. Between it and the shore there is a depth of  $4\frac{1}{2}$  to  $4\frac{3}{4}$  fathoms, named the Olinda channel, through which vessels may pass to the harbour.†

At the north end of the English bank a buoy striped red and white is or was moored ; and at the south end another, coloured red.

**Olinda Reefs**.—These are some dangerous flats extending from Olinda point about 2 miles, to which it is necessary to give a wide berth, as the soundings immediately off them are  $4\frac{1}{2}$  to 7 and 8 fathoms ; 10 fathoms is therefore considered the nearest depth that vessels should approach the point. In order to mark the outer edge of the shoals, a white can buoy is (or was) placed in 5 fathoms at about 2 miles E.S.E. from Olinda point.

In the offing outside the harbour the bottom is composed of fine white sand, but, nearer the coast, numerous patches of coral are interspersed, which are dangerous to hempen cables. The best anchorage for men-of-war, is with Olinda bearing North, and port Picao N.W., in 6 fathoms ; as this is the only spot in the

\* These depths on the Great and Little Bar are according to the survey of Baron Roussin. A more recent statement by the chief pilot of the port, M. Jose Faustino Posto, in March, 1856, represents them as follows :—

“ At spring tides the bar of the port of this city has 20 feet of water, and the small bar from 16 to 17, over which vessels drawing 14 to 15 feet water can enter. Those drawing as much as 17 feet can do so no higher up than the Poco.

As vessels come from the Mosqueirao in going out, and have to pass the inner bar near the lighthouse, they can do so only with a favourable wind, and drawing only from 14 to 15 feet.

The Great Bar being in a line with the Recife, is open to the swell. The inner bar is in smooth water, and is the greatest impediment to the navigation of the port. In the anchorages named Lamerias and Samenheos, vessels of any draught of water can load and unload with facility.”

† This depth of  $4\frac{1}{2}$  to  $4\frac{3}{4}$  fathoms should be considered uncertain, as the channel was stated, in 1850, to have grown up so much, and become so intricate, as to require a pilot.

bay, near the town of Pernambuco, where they can lie, without the danger of parting in three or four days.

**Directions:—Approach from the Southward.**—Cape Agostinho,\* or St. Augustine, in lat.  $8^{\circ} 20' 41''$ , is a high rugged projecting promontory, which may be readily recognised by its red cliffs, and by the church Nossa Senhora de Nazareth on its summit. It has also a barn and a battery on it; this latter is on its eastern extremity, and cannot be distinguished at any distance. Baron Roussin describes it as a hill lightly wooded, of moderate height, declining gradually to the sea, and rendered remarkable by the red cliffy spots at the termination of several points. Captain Kingston, R.N., says (1824)—“On making cape Agostinho, its extreme point will first appear like an island, on the top of which are a signal-staff and a look-out house. The land about the cape is red, and on its highest part are some cocoa-trees, among which will be observed the church with a small spire, and long building adjoining. There are also two houses, one situated to the S.W. of the church, the other on the side of the hill. A fort stands on the north-eastern part of the cape; but this is not visible at a great distance, as it lies near the beach. To the northward are a number of sand-hills, which at first sight appear like chalk-pits; and at a distance from these, within the bay, is another church.”

In the vicinity of the cape, at the distance of one or two miles, the soundings are of 10 fathoms, on a bottom of gray sand and gravel; it then gradually deepens until at 6 miles from it the soundings are 18 to 22 fathoms.

The coast to the northward of cape Agostinho bends in a little, and forms a slender bay, the northern part of which is terminated by point Olinda. About midway on this coast is the chapel of Nossa Senhora do Rosario, upon one of the heights, and having two towers, easily to be distinguished when approaching from sea. The shore is low, and covered with trees nearly as far as Pernambuco. In coasting at the distance of 2 to 4 miles from the shore, 12 to 10 fathoms water will be found on a bottom of sand and broken coral.

After having made cape Agostinho, keep at least 2 or 3 miles from the coast, until in sight of port Picao, bearing between N.W. and W.N.W.; then steer towards this fort (which is built upon the recife), approaching it according to the vessel's draught until the cocoa-tree at Olinda bears nearly N. by E., appearing between the two highest edifices of the town. With this bearing the vessel will be about three-quarters of a mile from the quay of the recife, and may anchor in 7 or 8 fathoms sandy ground, mixed with patches of coral; this bottom is bad, it is true, but it will be impossible entirely to avoid that in the road to Pernambuco.

**Approach from the Northward.**—The chief dangers in approaching the harbour from northward, are the reefs extending from Olinda point. These have already been mentioned, also the buoy on their outer edge. Great care is necessary to avoid them, and also to clear the English bank. Strangers bound to the harbour should make a frequent use of the lead. It has been said that small vessels may avoid the latter bank to the northward and westward by keeping close to the shore, at within half a mile distance, between Pernambuco and point Olinda; but that this passage should not be attempted by vessels whose draught of water

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\* Baron Roussin says that during the southern monsoon, cape Agostinho is the point which vessels bound to Pernambuco ought to make; and that the coast a little north of point Olinda should be made during the northern monsoon.

requires a greater depth than  $2\frac{1}{2}$  fathoms. In reference to this remark, it has recently (1850) been stated that the channel has become so intricate as to require a pilot's assistance for its safe navigation.

*The Road of Pernambuco* is dangerous in bad weather, as the swell is then very strong. If a vessel were to anchor but one point to the westward of the meridian of Olinda, she would be within half a mile of the quay of the Recife; and in case she should drag her anchor in getting under way, or should drive to leeward in a high wind, between S.S.E. and E.N.E., a very serious risk would be incurred. This is principally to be apprehended in the bad season, that is to say, from March to September, when the winds from these quarters are sometimes very violent.

The northern monsoon is not much more favourable than the other for vessels at anchor in the road of Pernambuco. Easterly winds are much more frequent than those from the north, especially with new and full moons; and though in this season the weather is generally fine, and the breakers not so strong as in the opposite season, yet it will always be prudent to take every precaution against accidents; and the first of these is not to anchor too near the land. We have already stated that the bottom in the road is of a bad quality; in fact, this anchorage, with cables liable to be cut, affords no safety; vessels, therefore, which frequent this place, should always use iron cables, which is the best remedy to guard against the effects of the coral and lost anchors, with which the bottom abounds.

Vessels commonly moor E.N.E. and W.S.W., in order to have a long warp towards the offing, as well as to be more firmly situated, and more ready for getting under way. It is prudent to have the sails and all things so disposed as to get under way promptly, should it be required. In the contrary case, drop an additional anchor in the evening, which raise next morning.

If compelled to remain some time in the Road during the southern monsoon, it may be convenient to have two anchors ahead toward the offing, and one anchor on the poop, to drop toward the W.N.W., in order to hinder the vessel's drifting during the calm which often succeeds a squall. The last anchor serves to resist the land breeze, which, however, is rare in this season, and not strong in the road at any time of the year.

Baron Roussin says of Pernambuco in 1819,—“At Pernambuco seamen may obtain every assistance they require; they will also find every sort of provision for their voyages. The water is good, and easily to be procured, either in the river by going a little way up, or at Olinda, from whence decked vessels, made expressly for the purpose, convey it on board the ships, either in the port or in the road. Fuel is the dearest of all the articles at Pernambuco.

The prevailing winds in the road are the tropical; that is to say, they generally blow from S.S.E. to N.N.E., with this qualification, that from March to September they blow more from the southward, and sometimes even from the S.W. than during the other part of the year. In this latter season they blow, almost without interruption, from E.N.E. to N.N.E.

The land-breezes are regular in this port, but commonly very weak in the road; they rarely come over the Recife, where they are deadened by the breakers; however, they weaken the beginning of the sea-breeze, which is in its greatest force, both within and without the port, from 10 A.M. till 5 P.M., that is during the absence of the land breeze.

The temperature at Pernambuco is commonly high, more especially during

the night, and till about 9 or 10 o'clock in the morning; after a few moments of calm, which are very oppressive, the sea-breezes begin to rise by degrees, which, reaching the shore, refresh the atmosphere until sunset. Notwithstanding the heat, the climate of Pernambuco is considered very healthy. The tides at this port are irregular, probably owing to its being near the entrance of the river, which is exposed to great swells, thereby increasing the volume of water. The stream of ebb continues some time after the water has attained its greatest height; nevertheless, the times of slack water are subject to regular periods, depending on the motion of the moon.

The rise of tide is in general about 6 feet in ordinary circumstances: but at spring-tides it rises to 8 feet, and the velocity of the current in the port is then 2 miles an hour.

At full and change it is high water at 4h. 45m. The rise at spring-tides is 6 to 8 feet.

The inner bar, which crosses the port, is defended by forts Bruno and Picao, the former built upon the low ground already described, and the latter upon the extremity of the Recife opposite. The distance between these forts, that is to say, the breadth of this port at its entrance, is at most  $3\frac{1}{2}$  cables. The pilots' marks for the two passages to Pernambuco are, for the Poco, a little pyramid or beacon (erected expressly for that purpose on the shore, and surmounted with a cross, named La Cruz do Patram) on with the church of St. Amaro, which is very conspicuous, and surrounded with cocoa trees; it is situated on the mainland, a little way in the interior of the country;—the direction of this line is nearly west. But before bringing that mark on, vessels approaching from seaward must take great care that they are within the English bank.

From the anchorage of the Poco, at less than a mile distant, may be seen the head of the English bank (when it breaks), all the interior of the port, and to the southward the fort Picao; also by running S. by W. port Mosqueirao will be gained.

Small vessels commonly enter at the other passage, which is situated almost immediately at the north point of the Recife, where fort Picao is erected. The mark to lead into this channel is the two southern turrets of the fort of Bruno in one. The pilots take charge of the vessels on their arrival in the road, which they call L'Almeirao.

The port of Pernambuco extends to the mouth of the river Capibaribe, whence it receives its water. It is sheltered from the sea by the Recife, the low parts of which have been made level with the others, so as to form one continued quay; but this barrier does not afford sufficient security from the off-shore winds when they blow very strong, though they rarely have force enough to cause any damage to a vessel, if well moored."

The following remarks on the approach to Pernambuco are extracted from the *Nautical Magazine*, 1835:—

"Ships bound to Pernambuco from eastward should get into the latitude of Picao lighthouse, or  $8^{\circ} 4' S.$ , and run down in that latitude until they see the light. When approaching the coast at night, the lead should be used; soundings will be got about the same time the land is seen from the mast-head, say in 50 fathoms, sandy bottom.

Should a vessel fall in to the northward of the port, and not see the light, great care should be taken not to run too far in, or into less than 20 fathoms, until daylight. The town of Olinda, situated on an eminence, is a mark which

cannot easily be mistaken. It has a beautiful appearance when approaching it from the eastward, in the morning: indeed, it is the principal object of any notice along this part of the coast. Having got sight of Olinda\*, which is well-known by its churches and large buildings, Picao lighthouse and town of Pernambuco will next be seen a little to the southward. Get the lighthouse (Picao lighthouse) to bear W.N.W. and run in, in that direction; Olinda reef and the English bank will then be avoided. Anchor in 8, 7, and 6 fathoms, about 1, 2, or 3 miles from Picao light; but do not bring it to bear any more to the northward than N.N.W.

A near approach to the coast northward of Pernambuco is dangerous, on account of extensive reefs that lie 2 or 3 miles from the shore; these reefs also extend as far northward as Itamaraca. This is not the case to the southward of the harbour, for, from the shoal that lies off the Jangada passage, before mentioned, to cape Agostinho, the ground is clear, with the exception of some small patches of reef that lie close in-shore.

Vessels may know when they are northward of Pernambuco by the land appearing green and full of verdure, as far northward as Itamaraca, and no appearance of any white banks of sand. When abreast the north end of this island three large cocoa-nut trees will be seen to the W.N.W. Olinda may be seen from the mast-head at the same time to the S.W.; a white fort, 6 miles north of Olinda, named Pao Amarello, will also be seen. Should the wind prevent a vessel from lying alongshore on the port tack, stand off until midnight, or morning, as the wind then is apt to blow at right angles with the shore, which will enable them to gain their port.

*Should a vessel fall in to the southward about cape Agostinho, or St. Augustine,* the land is very remarkable, having ten or twelve cocoa-nut trees on its summit, and reddish banks of sand. There is also a large building among the cocoa-nut trees; but the most remarkable objects about this part are some white craggy cliffs, about three miles northward of the cape. Olinda will also be seen to the N.W.

*Should a vessel fall in to the southward of cape Agostinho, or St. Augustine,* a large mountain will be seen, having the appearance of a saddle, and also two flat mountains, one on each side of the saddle mountain, bearing in a westerly direction.

*To enter the harbour of Pernambuco:*—There are generally pilots employed to conduct vessels entering the port; but should none be ready, get the vessel under way about two, or one and a half, hours before high water (if at anchor.) Should the vessel not be drawing more than 16 or 17 feet, the small ship channel will be sufficient. Keep the two south turrets on fort Bruno in a line, which will lead within twenty yards of the rock that lies to the north of the lighthouse; this rock is steep close-to, so that a vessel may luff close round it, and keep close to the reef, if the wind permits, until within a cable of the lower tier of shipping, then drop the port anchor, and await the orders of the harbour master or pilots. The bar of Pernambuco, or the shallowest water, is a little above fort Picao. Vessels drawing more than 16 feet generally anchor in the Poco; that is with the lighthouse bearing about S.E. distant two cables, where they may discharge

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\* The lighthouse on Olinda point, showing an *intermittent white light*, now affords an additional means of recognising Olinda. (See page 14.)

part of their cargoes. This depends, however, on the state of the tides. Large ships discharge and load also outside the harbour to the westward of English bank, and about three-quarters of a mile N.E. of the lighthouse. This anchorage is called the *Well*.

Vessels lie moored at Pernambuco, with two anchors down from the side next the town, and also two ropes or chains to the reef. Four vessels generally lie in a tier, and are sheltered by the reef, which is formed by nature, with the exception of a few stones, which have been laid down a little above fort Picao. The sea inside the harbour is in general smooth, except at the top of high-water spring tides, when there is not only a heavy swell, but also a strong current rushing over the reef. In this case, good ropes or chains should be fastened to the reef. This only lasts about two hours at each high-water during a few days at spring-tides.

*Olinda Reef.*—Leaving Pernambuco, great care should be taken not to stand too near this reef, as about the outer edge there are some rocks lying at some distance outside of it. The greatest danger of coming in contact with this reef is, when leaving the harbour late in the afternoon, with the wind is such that it cannot be cleared without tacking. In daylight there is little to fear, as the broken water can be seen; but after the first tack, night may approach, so that the breakers cannot be seen, and also a strong northerly current (which is generally the case with the wind from this quarter) which in this case requires great care. The safest way in this case is to keep well to southward.

*English Reef.*—The centre of the bank or reef lies about E.N.E. from Picao lighthouse, distant  $1\frac{1}{2}$  miles. The least water found on it was 13 feet at low water spring-tides, and very uneven rocky ground. To clear this reef to the northward, keep the highest church in Boa Vista open northward of Picao lighthouse. To clear it to the southward, keep the south turrets of fort Bruno shut in with the lighthouse. This bank is only dangerous to vessels of large draught, for when vessels are coming out of Pernambuco it is generally high water, at which time there is plenty of water over it. However, when tacking in the bay at low water, the former marks must be observed, as also when coming to anchor, give it a good berth to the southward, as with strong S.E. winds a very heavy sea sets into this bay. When at anchor too far to the northward, a vessel may drive on it before she could be brought up. The sea breaks heavily on it with the wind from this quarter, in the same manner as on Olinda, and other reefs to the northward of the lighthouse. On entering or coming out of the harbour with open boats, these breakers should be avoided, if possible, as accidents often occur with the boats getting amongst them.

The pilotage in and out of this place is very expensive; although the pilots have no branch, yet it is customary for strangers to employ them, and even vessels trading to the port seldom refuse them. They are more serviceable in mooring and unmooring the vessel, than any great service they can render in coming in or going out. They have generally a good boat's crew, and some of them are very expert in diving to clear away anything that may be foul of the anchor, a circumstance that often takes place. Although there is one charge they make, that is, shifting the vessel down from the discharging berth to that of loading, which could be done without their assistance, still they force their services, and, under particular circumstances, a master of a vessel is induced to take them.

Vessels loading a sugar cargo in Pernambuco should not load deeper than

14½ feet until they go outside. However, this greatly depends on the wind; for, should it be from the S.E. quarter, and a good breeze, there is little danger of going over the bar, when drawing 15 or 16 feet, on the height of spring-tides.

*Remarks on leaving the Harbour:*—Vessels generally begin to unmoor at half-ebb, the tide previous to their going to sea, when they have plenty of time to get all their ropes or chains in, and the vessel winded, deck clear, &c. Should the wind be from the S.E., a good breeze, get under way one hour before high water, keep at a proper distance from the reef, and make all sail possible; luff close round the rock that lies to the northward off Picao lighthouse, and observe whether the trees on Cocoa-nut island open out to the eastward of the lighthouse; if they do, the rocks that lie to the northward of this channel will be passed to windward. Then there is only Olinda reef to fear. But should the wind be such that these rocks cannot be weathered, which can easily be seen by the cocoa-nut trees not opening out to the eastward of the lighthouse (or the shipping in the harbour), in this case, these rocks must be kept on the starboard hand, or passed to leeward, and therefore beat through the wide channel, as before directed.

Should the wind be such that vessels cannot lie along the reef, warping down then becomes necessary, and, before sail is made, they ought to be close down to fort Picao. Masters, or rather pilots, not taking this precaution, often get to leeward, a circumstance which is often attended with danger, and sometimes proves fatal. This was the case with the brig *Alcides*, which was wrecked in 1832 abreast fort Bruno.

When ships are obliged to anchor outside, previous to their entering the port, which is generally the case, the masters usually go in with the boat, either to the King's wharf, or else alongside of a visit boat, with one mast and flag, lying inside the reef, a little above the lighthouse. The cargo is generally brought off in boats, or large launches, and attended with very little risk, as the distance is not great, and there is not much swell. From this advantage, and the regular sea breeze, the wall formed by nature with its strong guns for mooring posts, that are proof against any accident that may occur, and the healthiness of the climate, this port may be considered one of the safest and best on the Brazil coast.

It is high water on the days of full and change of the moon at Pernambuco, at 4½ h. and the rise of water, with spring-tides, is 8 to 6 feet, and 5 with neaps. The highest tide is generally two days after the full and change."

**Pernambuco.**—The commercial port of Pernambuco consists of three divisions, named Recife, San Antonio, and Boa Vista, of which the first two are situated on sand-banks, surrounded by water and connected by a bridge. In general the town is well built, and there are many lofty white-washed houses, with red tiles, and plenty of verandahs and windows to admit the cool breezes; for miles also in every direction towards the interior, there are comfortable villas, some very large, and constructed with considerable taste, so that Pernambuco bears the appearance of being a very busy and thriving town. When approaching from sea it has a peculiar appearance, the land being very low, so that, seen from a distance, the buildings seem to stand out of the water; the buildings are seen first, then the shipping, after which the general features of a large town become visible.

The *Recife* division of Pernambuco is that nearest to the sea. It stands upon

a long isthmus, or neck of land, which extends south from Olinda point, in all to the extent of about a league. In front of its southern extremity, is the *Recife* or reef\* which forms the harbour, and upon this is built fort Picaô and the light-house, which have already been mentioned. It is in this division of the town that most of the foreign firms are located.

The division named San Antonio is that part of Pernambuco which is inhabited chiefly by the shopkeepers. It is on low land, and is connected to the *recife* by a bridge. In this division there are large houses and broad streets; and here are situated the Governor's residence, the Treasury, the Town-hall, and several convents. There are also several squares, which preserve a gay and lively appearance.

Connected to San Antonio by a long wooden bridge is the district of Boa Vista, which is situated on low land formerly overflowed at high water. The houses are many of them very good, and there are several broad and handsome streets; but in other parts the houses are very bad, and built in an irregular and straggling manner, so that this is with reason considered the most inferior part of Pernambuco.

**Olinda.**—Olinda is situated on a small hill, at the distance of 3 miles from Pernambuco; at the summit of this hill is a monastery. The town is small and thinly peopled, though most of the merchants of Pernambuco have seats here. The houses are beautiful white buildings, with handsome gardens; the former rise one above another, and the church, which is the highest object upon the coast, may be seen a great way off to seaward. From thence a chain of moderately elevated hills sweeps inward and terminates at cape Agostinho, so that Pernambuco is really seated in a sort of valley. The entire summit of the surrounding high lands is crowned with forests and green foliage; and in looking around scarcely an opening appears, although, in fact, the country is populous and cultivated. Numbers of buildings, also, within the suburbs of the city, are wholly or partially hidden by lofty palms, mangueiras, cajueiros, and other trees. The interval between Recife and Olinda is in striking contrast to this appearance, being a perfectly barren bank of sand, or narrow beach, upon one side of which the ocean breaks, while on the other side, only a few rods distant and nearly

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\* Mr. William Hadfield says, in 1854,—“This reef of coral rocks runs along nearly the whole of the Brazilian coast, and is supposed to be continued inland, where the coast projects beyond the line of reef. At Pernambuco it has positively all the appearance of a wall some yards wide, just as if erected by the industry of man; it extends along the whole sea front of the town, breaking off the swell of the ocean, and leaving the water in the harbour or creeks perfectly smooth, except sometimes at high water, and at periods of high tide, when the sea, finding its way over the reef, causes a little bubbling inside. The entrance is through a kind of break in the reef, which also forms the mouth of a river, intersecting the town, but not going any great distance inland;—passing through and rounding the reef, in an instant you are in smooth water, and in Pernambuco harbour. The width of the passage is not much above 200 yards, taken from the reef to the shore, and this is lined with quays and wharves, which have been much extended of late years, and a dredging-machine is now constantly at work, deepening the channels, which are influenced by the current and freshets of the river. The bar formerly allowed only of the passage of vessels drawing 14 feet, but it is said that it is now quite safe for those of 15 to 15½ feet; and hopes are entertained that it can be deepened so as to admit the largest class of vessels, which would be a boon of immense importance to the place.”

parallel, runs a branch of the Bebebe river. This stream is navigable to boats as far as Olinda, and forms the principal channel of communication with that place.

*Climate.*—At Pernambuco the heat is excessive, the thermometer frequently being at 90° in the shade. During the night it is always calm, with much lightning. At about nine in the morning the sea breeze comes gradually, and is strongest about noon, when, by degrees, it dies away into a calm, that generally takes place toward sunset.

The sudden change of temperature common in other climates, is rare in Pernambuco, especially during the summer months, at which period the weather is delightful. In the rainy season some days occur when the atmosphere is charged with haze and mist, rendering the sun invisible: some minutes before the rain fall, the clouds descend thick and black, the air is oppressively close, the heaving of the sea is suspended, and a gloomy calmness prevails,—sure indications of the approaching rain, which shortly pours down in torrents, refreshing the parched earth, and fertilizing the soil.

**The COAST.**—In following the coast southward from cape Agostinho, the shore will be noticed to be low and covered with shrubs; it also shows with a white sandy beach. Immediately facing it is the *recife* and other small detached reefs, outside of which the depth is gradual to the distance of about 6 miles. In coasting along, there may be found, in 15 or 16 fathoms, good anchoring ground, of white sand; the same bottom may be found in 8 fathoms; but, in less depth, the soundings are generally of rock and shells.

At about 2½ miles south of cape Agostinho, there is a small and shallow stream, named Ipojuca, and beyond that, at about the same distance, is the village of Maracay. Four miles south of Maracay there is a small inlet in the reef, named Porto das Gallinhas, which is believed to be too shallow to admit even small vessels; it is formed and sheltered by the reef, and has been stated to have a depth of 12 feet, but this we think is very doubtful, as other statements mention that only boats can enter. Three miles south of this is point Meracahype, which is low, covered with wood, and appears at a distance to be inundated. When sailing along, the point does not appear to project but from a position a little north of it, the point is visible.

At a short distance within point Meracahype, there is a hermitage. When at some distance outside this point, some elevated land will be observed, named Serra Sellada, or Saddle hill, from its resemblance to a saddle; it extends north and south, and has a deep break or dip in the middle, dividing it into two round knolls. The mountain is situated in lat. 8° 25', and will be readily recognised, because in all this part of the country there is not another hill like it, all others being of less elevation, more level and covered with brushwood. When just open to the southward of cape Agostinho, it may be seen bearing S. 75° W., and when in a line with point Meracahype, nearly N. 95° W. (*true bearings*.)

**Santo Alexio Island.**—This island was partially examined by Commander C. H. M. Buckle, R.N., in 1843, and from the published sketch of the anchorage, we gather the following description.

The island is about a quarter of a mile in extent, its greatest length being from S.E. to N.W. It appears to be composed of low land, its projecting points, however, rising into small hills, of which that facing the S.W. is probably the highest, as it is said to be 70 feet above the sea. Near this hill there are two small houses, having near them a well, and on the eastern side of the island there is a spring of

fresh water. These houses are stated to be in lat.  $8^{\circ} 37' S.$ , and long.  $34^{\circ} 59' W.$ ; in approaching from seaward, a depth of 9 fathoms will be found at about  $\frac{1}{2}$  of a mile eastward of the island.

From the northwest point of the island a reef extends to the westward, about 2 cables, and is separated from the reef bordering the coast only by an interval of about half a mile, in which the depth appears to be 4 to  $2\frac{1}{2}$  fathoms. The southern point of the island has also a reef running from it, so that it should not be closely rounded; this reef is about half a mile long in a south-westerly direction, and has upon it a patch of rocks named the Turtles, upon which the sea breaks at high water. At  $\frac{1}{4}$  of a mile S.W. from the extremity of this reef the depth is probably 4 to 6 fathoms.

The island and reef are distant from the reef bordering the coast about  $\frac{1}{4}$  of a mile. In this space there is anchorage, but principally, however, immediately under the island, between the extremities of the northern and southern reefs. The depth of this anchorage is 5 to 4 fathoms, sand, and here ample protection from a heavy sea is afforded by the island and its surrounding reefs, from all points between N.N.E. round by east to S.E. This anchorage, it will be seen, is about  $\frac{1}{4}$  of a mile from the houses on the island, and almost immediately opposite the Turtle rocks. It should be used, we think, but temporarily, and then only by vessels having occasion to communicate with the village of Serenhen on the main.

In approaching the anchorage from northward, it appears necessary to gain a position of East from the village of Serenhen, whence steer to the westward until in mid-channel between the island and the shore. Steer now to the southward, keeping the lead going, until due West of the small hill forming the south-west point of the island, when steer E.S.E. until the hill bears E.N.E. and then anchor. In following this route, a depth of 7 to 5 fathoms will be found when passing to the northward of the island, which will decrease to 4 and 5 fathoms as the anchorage is approached.

In approaching the anchorage from southward, some care is required to clear the reef extending from the south end of the island; and it is recommended not to approach it nearer than 6 or 7 fathoms. The mark to avoid this reef when rounding it, is the tallest of the cocoa-nut trees at the village of Serenhen, bearing N.W. by N. When round the reef, or when the Turtle rocks bear N.E. by E.  $\frac{1}{4}$  E., steer up for the anchorage. In following these routes, the soundings will diminish gradually from 10 to 8 and 7 fathoms, and when off the point or extremity of the reef, or when the Turtle rocks are brought in one with the southern hill of the island, the depth will be only 4 fathoms.

At Santo Alexio island it is high water on the days of full and change of the moon, at about 4h.; and the rise of spring-tides is 10 to 12 feet.

Of the village and river Serenhen, mentioned in the foregoing description of Santo Alexio island, we have no description; nor have we any account of the river Ferosa,  $1\frac{1}{2}$  leagues more to the southward. We believe, however, that both rivers are too shallow to admit anything larger than boats, or the ordinary coasting vessels of the natives.

**Tamandare.**—This small port is situated about 3 leagues S. by W. from Alexio island, and is believed to possess some advantages, although a close examination has not been made of it. It is formed by an opening in the reef, in which is the anchorage, and which opening is larger than most others in this part of the coast. The space and depth are considered sufficient for vessels of a tolerable

size, and it has even been stated that there is room for three or four frigates. The depth is 3 to 4 fathoms, and the entrance and interior anchorage are defended by a fort built on the coast.

Tamandare is the best, indeed the only place between Pernambuco and Bahia which is capable of affording shelter. It is, however, very small, and its exposure to all winds between South and N.E. by E. renders it a very undesirable place to anchor in. The only defence that the anchorage has from the sea is the reef, which in many parts is only a few feet above the water. To run in, the assistance of a pilot is necessary.

Pimentel says of Tamandare, that "the bar is among the reefs which encircle the coast; but when once within it, the opening forms the best bay on all the coast, as there is good anchorage, on clear ground, with a depth of 5 and 6 fathoms at the entrance, and 4 and 5 fathoms within. It is, moreover, defended by a fortress with four batteries. When approaching the bar, the soundings will gradually decrease from the distance of 6 and 7 leagues, at which distance from the coast a depth of 24 and 25 fathoms will be obtained. It is not considered prudent to attempt this place without a pilot, the reefs about it being numerous; there also appear to be no leading marks by which its exact situation may be known.

At about 4½ miles south of Tamandare fort, there is a small rock near the shore, named Pedra de Gonde, which is immediately to the south of Tamandare creek. Thence the coast trends south-westward, and, we believe, there are no dangers outside the reef which borders the shore, so that a vessel will go clear of all obstruction, if an offing of 7 or 8 miles be given to the land. In sailing along, a vessel will pass in succession the rivers Una, Piracununga, Dordaris, Mangos, and Soldado. In about lat. 9° S. is Barra Grande, the distinguishing mark of which is the high land of St. Bento on the south side, and above it the church of St. Bento.

**Porto Calvo**, in lat. 9° 11' S., is small, but sufficiently deep to accommodate vessels of 120 tons, and it is said that as many as six of these can be admitted. The town is rising in importance, and will probably become, at no distant date, a place of some consequence. Off this part of the coast, at the distance of about half a league, there is a ledge of rocks, having an opening which forms the port, and in which there is a depth of 5 or 6 fathoms. Within, there is a depth of 3 or 4 fathoms, but to enter, a pilot will be needed by strangers. It is recommended to use the lead freely, and to keep a good look-out, as the place has not been surveyed. Within the anchorage, the water is smooth, on a bottom of sand.

From Porto Calvo the coast runs to the S.W. about 3 leagues, to the river Camaragibe, and is level with a white beach; there is also some low brushwood on the land, and fronting the shore is the reef of which mention has been so frequently made. On the south side of the river, stretching along the shore, there is a range of bare hills, or cliffs of red sand; these extend towards the river Antonio de Grande, or Great Antonio river.

At a few miles southward of the river Antonio de Grande is the entrance to the Sapuagira river; and beyond that there is another stream named Antoniomirim, near to which there is a range of red cliffs and three round hills, of which the centre one is the lowest in elevation. All these various rivers are shallow, and are of but little importance as respects even a temporary shelter for the smallest vessels. All have bars before them, so they can be used only by the native *jangadas*, or coasting vessels.

Point Jurugua, close to the town of Maceio, forms two bays where vessels of considerable size may find an occasional shelter. Vessels approaching this place from northward, will see, far in the interior of the country, the Serras de Marambaya, a chain of lofty hills, visible about 45 miles. Their approximate geographical position is lat.  $9^{\circ} 25'$  S., long. about  $36^{\circ}$  W., and they are readily distinguished from the surrounding land, as it is flat, and without any variety in appearance, consequently they form a landmark of some value to those making the land immediately from seaward. All this part of the country is extremely beautiful, but the richness of the soil is not of course very apparent from sea. The shores are generally of fine sand, sometimes variegated with clusters of cocoa trees, and occasionally there are small portions of steep cliffs of a red colour.

**MACEIO** :—Maceio has recently grown into considerable commercial importance, and it is now the principal port of the province of Alagoas, the province adjoining Pernambuco. The town is situated on the western side of point Jurugua. Its population in 1843 was estimated at 5000. The port is protected by a reef of rocks, dry at ebb-tide; and within this, on the shore side, is the beach, composed of white sand. In the whole of the harbour there is not, we believe, one convenient landing-place.\*

At Maceio the coast for a short distance has an East and West direction, and upon one of the projecting points there is a small fort, which will be readily distinguished when approaching from the eastward. The outer point, east of Maceio, is Ponta Verde (Green point), so named from the cocoa trees upon it. This point has breakers upon its rocky extremity, and the town is hidden by it to those approaching from the N.E. Off this part of the coast there are 10 fathoms on a bottom of madrepore, at the distance of a mile from the land, and the soundings appear to increase gradually to 25 and 30 fathoms, the latter being 12 to 18 miles from the shore. It is said that in fine weather vessels may anchor on almost any part of this bank of soundings, but that they ought to be ready to get under way should the sky present a threatening appearance.

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\* As we bore up to the port of Maceio from the southward we found the coast very flat, sometimes exhibiting a sandy beach, and anon banks of 80 or 90 feet elevation, denominated, from their prevailing colour, the red cliffs. We approached so near these cliffs as to perceive distinctly their stratification, which resembled successive layers of brick.

The port is formed by a reef of rocks visible at ebb-tide, which runs north and south for a sufficient distance in a right line, and seems to form an angle with an extreme point of land on the north. From the same point the beach sweeps inwards in the form of a semicircle. The sand on this beach exhibits a snowy whiteness. (*Mr. Kidder, 1844.*)

The province of Alagoas, of which Maceio may be considered the chief town, and it undoubtedly is the principal port, derives its name from the lakes near the coast, upon the banks of which the capital was originally placed. With the exception of the Reconavo of Bahia, there is, probably, no part of Brazil so populous as the greater part of this province, which, embracing an area of about 150 by 60 miles, has a population of fully 250,000, chiefly addicted to agriculture, here prosecuted with great success, as the soil is most rich, yielding nearly every Brazilian produce in great profusion. There are numerous rivers in the province, but none of them navigable for any distance, except by boats, in the construction of which the inhabitants greatly excel. In this province is the famous cataract of Paulo Afonso, over which the Rio San Francisco is precipitated a perpendicular height of 50 feet. The town of Alagoas itself contains about 14,000 inhabitants; it is situated in the midst of an agreeable and fertile country, surrounded by some of the finest timber trees in the empire.

**Light.**—A *fixed* light, *flashing* at intervals of two minutes thus,—fixed for 70 seconds, eclipsed 16 seconds, flash 12 seconds, eclipsed 22 seconds,—is exhibited from a lighthouse on the west part of the mountain, immediately eastward of the town and distant one mile from the anchorage; it is 208 feet above the sea, and visible 22 miles.

On the shore side, near fort Maceio, is the village of Jurugua, which stretches along as far as another fort, or about a mile more to the eastward. The intermediate coast is very low and sandy.

The entrance to the port faces the S.W., that is, parallel to the coast, so that vessels may, with some care, run in and find shelter from the sea; but the reef which shelters the port does not afford much protection from off-shore winds, and, besides, there is not any protection against these winds upon any part of the coast during the southern monsoon.

It is high water here, full and change, at 4h. 30m., and the rise of tide at springs is 8½ feet.

Captain Kingston wrote of Maceio, in 1820:—"Maceio bay, formed partly by the recife to the northward, is a beautiful place, in which merchant vessels may anchor, at about a quarter of a mile from the beach, in 3½ fathoms, sandy ground. In rounding the recife, vessels will have 7 fathoms, at a cable's distance. The bay may be known by a bluff or cape-land to the southward, between which and the town is a square patch of dirty-white land, appearing like a cliff. Between the bluff and this patch there is a white road up a hill; there is also a road to the northward of the town. A low point will appear thickly covered with cocoa trees. On the rising part of this point, and clear of the trees, are two houses with red tiles; and as you approach, you will see a white bank and several houses on the beach. The marks for anchoring outside the recife, are the bluff or southern extreme of the Cape-land S. 80° W.; the Patch N. 74° W.; the church N. 59° W.; and the small fortress N. 53° W. Here the depth will be 8 fathoms, but the ground is by no means clean, and further out it becomes more foul. Inland, to the northward of Maceio, about 8 leagues, the mountains rise high, and may be seen 10 or 12 leagues off the shore; and nearly at a similar distance is a range of white cliffs, with a small village on a hill about 3 miles northward of the cliffs.

Commander Roos R.N. says of Maceio, in 1835,—“On approaching Maceio, when at a distance of 12 or 14 miles, a small white building can be clearly made out. It is a powder magazine, and is situated on a wooded bluff which overlooks the town and harbour. The land may also be distinguished by a red spot on the face of the cliff about 5 miles to the S.W., and by a white chapel with two towers, in the same direction; Mount Barriga, at a distance in the interior, may also be observed. It stands alone, and is higher than the land which forms the coast, but is otherwise not remarkable.

Maceio, being the only convenient anchorage between Bahia and Pernambuco, enjoys a considerable commerce, and has an extensive communication with the interior. Many English vessels annually touch here. Supplies are to be had at a moderate rate, and excellent water can be obtained in the adjoining harbour of Pajucara, at a well near the beach.

The port is formed by the point of the Barrier reef, terminating abruptly, which extends along the shore here, a sandy beach, forming the continuation of the coast for some miles to the southward. It is an open bay, but affords protection from the prevailing winds, which blow from N.N.E. to E.S.E. throughout the greater part of the year.

The men who fish in the *jangadas*, or sailing rafts, which are constantly to be met with on this coast, are good pilots; but there is a regular harbour master at the village of Jurugua, who will come off to pilot ships, on their firing a gun.

Persons acquainted with the port generally approach it, keeping within a quarter of a mile of the reef, and in this manner rounding the point; but strangers are not recommended to do this, as the soundings are irregular, and the Baixo, with only 15 feet of water on it, is to be avoided. When hauling into the anchorage it is a safe rule not to bring the powder magazine to the eastward of North, till past the point of the reef.

In the nine summer months this port may be deemed safe, but in June, July, and August, when the southerly winds prevail, it is very much exposed.

There is an adjoining harbour (to the east), formed by the same reef, known as *Paiçucara*, which affords shelter to small vessels only. It is shaped like a basin, the entrance being near the centre. It is very shallow, and seldom used, as, with the wind to the northward of N.E., a vessel cannot fetch in."

Captain Drinkwater, R.N., observes,—“The land to the northward of Maceio is of moderate height, abounding in red cliffs. Above the port there is a remarkable appearance, resembling a road cut up the hills; this is a pretty good mark. The harbour is formed by reefs, the entrance round the southern end. H.M.S. *Doris* anchored in 8 fathoms, rock, and broke the anchor in heaving up three hours after. A little farther in, the bottom is clearer. There is a constant swell setting in.”

**Porto Francez.**—At about 3 leagues to the S.W. of Maceio there is a small place named Porto Francez, and further on in the same direction, is the outlet of the river San Miguel. This part of the coast has been but imperfectly examined, the information we have of it should therefore not be too much relied on.

It is said that the bar of San Miguel das Alagoas is the entrance to a little river flowing from the N.W., and that it crosses a lake, on the banks of which is a small town named Santa Anna. It is also stated that with this town a considerable coasting trade is carried on, chiefly in cotton, sugar, and timber, the produce of the adjacent country. This latter is brought from the neighbouring heights upon slopes, by which it is slid along to the landing places.

The bar of San Miguel admits very small vessels only. The same is the case with Porto Francez, a small anchorage at about 2 leagues more to the northward, against the hamlet of Remedios, and at the base of the point Massaveiro, forming the south side of a large valley occupied by the Rio das Alagoas, and by the two lakes which give their name to that river. Craft drawing 6 feet water may enter Porto Francez, the only point of communication from the lakes to the sea. The larger coasters stop in the exterior anchorage for receiving, by the *jangadas*, the merchandise of the country.

**Jiquia or Jigua.**—This is a small stream about 15 miles southward of the river San Miguel. The coast between is about 40 feet high, almost level, and terminates to seaward by a few steep cliffs of a reddish colour; the interior of the country is also rather woody, and has a pleasant appearance. The bar of Jiquia is not always navigable even by coasting vessels, for these are generally obliged to anchor outside; but with spring-tides the water rises high enough to admit the country smacks, which the abundance and proximity of the woods induce the natives to construct on the borders of this river.

In proceeding to the southward from the river Jiquia, the entrances to several rivers will be passed and the coast will be noticed to be bordered by the reef of

which mention has been so frequently made. The first river met with will be that of Poxim, upon the banks of which there is a small hamlet named Conceicao; 9 miles from this is the river Coruripe, and 24 miles further is the entrance to the river San Francisco. These rivers are all shallow, but the San Francisco is sufficiently deep to admit vessels of a moderate size.

Of this part of the coast of Brazil, Baron Roussin remarks that—"The intermediate land between the river San Francisco and Alagoas in lat.  $9^{\circ} 40'$  is low and sandy, and bordered by a rocky reef; it also makes but few inflexions, the directions of the coast line being N.  $40^{\circ}$  E. and S.  $40^{\circ}$  W. In this space are the bars of the rivers Coruripe, Poxim, Jiquia, San Miguel das Alagoas, Porto Francez, Porto Jaragua, Santo Antoniomirim, Santo Antonio, and Cammaragibe, which are all formed by openings in the reef, and can be entered only by the small coasting vessels. These openings may, however, be approached without danger, excepting the bar of Coruripe, off which, at the distance of about 3 miles from the land, there is a rock named Dom Rodrigo, which may possibly belong to the chain of reefs bordering the coast. Off the other parts of the coast vessels may sail to about 2 miles of the land, as at that distance they will generally find from 11 to 14 fathoms.

The Dom Rodrigo rock, and a few others contiguous to it within a small space, are visible only at low water, and were formerly known as the banks of San Francisco. They were hitherto supposed to have a great extent, but we did not find them exceed 3 miles in breadth, and if we suppose them to extend at that distance from the coast so far as the bar of Jiquia, we think that that will probably be more than the real extent of their boundary. Our soundings leave very little doubt on this head: the natives, however, recommend, in passing the rock, not to go into a less depth than 14 fathoms, especially with a large ship; and we are also of this opinion, for there can be no occasion to get into a less depth, or approach nearer to this part of the coast. It is said that coasters may pass within the rock; if so, this is certainly not the only point where they may go between the Recife and the coast.\*

Throughout all this extent of coast we have found the winds in the northern monsoon subject to daily variations, the knowledge of which is useful when going to the northward. During the night the land breeze is very seldom felt far from the Recife; but at the approach of day it freshens, and joining with the sea breeze, draws from the northward until midday; after which time the wind blows more from the eastward, making an angle of about two points between that of the morning and that of the night."

**RIO SAN FRANCISCO.**—This river, of which the outlet is in lat.  $10^{\circ} 28'$ , is one of the largest rivers in Brazil. It takes its rise near the Villa Rica, about 80 leagues W.N.W. from Rio Janeiro, and is said to be navigable throughout the greater part of its course, so that it affords valuable facilities for internal communication. It extends from South to North in nearly a parallel direction to the coast: but near its outlet it becomes comparatively shallow, the country in this part of its course being flat and monotonous; it is consequently not easy to enter,

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\* The coast between the rivers Jiquia and San Francisco ought to be approached with considerable care, because the survey by Lieut. A. Vital de Oliveira of the Brazilian Navy in 1857-59 shows that there are numerous reefs off it, hitherto unknown. To go clear of these dangers vessels should not approach the land nearer than 6 miles, and keep in not less than 12 fathoms water.

and strangers ought not to attempt to do so without having a pilot's assistance. The depth at the entrance is generally 10 to 12 feet at high tide, but this is greatly dependent upon the amount of water in the river and upon the strength and direction of the wind, a strong wind opposed to the current out of the river tending of course to check the rapidity of the stream and to keep the water in, while a wind favourable to the current assists the water out.

The country about the entrance to the river San Francisco is very low, and presents few good objects as marks, so that considerable caution is required when making the land. The only mountains which can be recognised are those of Itabayana and Pacatuba; but these are a considerable distance in the interior of the country, and situated too far from the mouth of the river to be seen, except in clear weather, when steering on its parallel.

The entrance to the river is bounded on the south side by point Manguinha, which is low and covered with mangroves; it projects to the E.S.E., and has heavy breakers extending at least 1½ miles from it. The northern point is lower than the other, and is formed of a quicksand, destitute of vegetation; there are also breakers at this point, so that the channel into the river is between these breakers. Vessels may anchor opposite to this point and wait for a pilot.

*Light*:—A lighthouse stands on the north point of the river's entrance, which exhibits a *fixed white light*; elevation, 69 feet above the sea, visible 11 miles.

The surrounding country is very populous, and produces sugar, cotton, timber, tobacco, &c. The most considerable town in the vicinity is Penedo, which is 7 or 8 leagues within the river.

Pimentel has described the Rio San Francisco as a broad and rapid river, subject to great inundations in the months, September to March. He says also that during this season, so strong is the current that it cannot be stemmed by an eight-oared barge. Small craft only can enter it, partly owing to the rapidity of the stream, and partly to the shoals at its entrance.

Mr. Hadfield says of the Rio San Francisco,—“This river, though it might be made navigable for hundreds of miles above the falls of the same name, and be rendered a source of valuable commerce, is navigable only by small smacks for comparatively a very short distance from the sea. All goods destined for the interior further up having to be carried on the backs of horses to another part of the river, and there put on board of jojos, that is, two or more canoes lashed together, and traversed at top by a piece of board. It is worth remarking that in ascending this river, and indeed most rivers on this coast, the wind blows up for some two hours continuously, which admits of sails being used, and the descent is easily effected by the current without the wind, which blows downwards for nearly the same space of time towards the coast.”

At about 6 miles W.S.W. of the entrance to Rio San Francisco, there is a small opening in the coast, called by the natives the Barra Nova. It is a place where the river discharges itself when it overflows, and of no use to navigation.

**RIO JAPARATUBA.**—At about 36 miles southward of the Rio San Francisco, is the entrance to the Rio Japaratuba, a rivulet which the pilots say is not navigable. The coast between is dangerous during strong winds from the S.E., because as it bends more to the east than the coast to the southward, vessels that are wind-bound, and ill served, cannot well tack so as to steer to seaward. The shore here is flat, and the bottom adjacent is of hard sand, in which the anchors do not hold fast; therefore vessels should not approach too near the land. At the distance of from 3 to 12 miles off the shore the depth is 30 fathoms, with the exception of one part, about 6 miles to the southward of the entrance of the

river, where Baron Roussin did not find ground at 40 fathoms. In sailing along the coast from Rio San Francisco to the southward, the Serras de Pacatuba will be seen, bordered by the Areias, or Sands of St. Isabel, beyond which is the river Japarutuba: then, in an opening of the coast, about 10 leagues up the country, are the Serras of Itabayana, a group of mountains seen at a considerable distance, and apparently joining to the back of the Morros de Telha and the Serras de Coralinho; to the north-eastward of which the coast is quite low and uniform. The summit of the highest of the Itabayana mountains is estimated to be in lat.  $10^{\circ} 47' 10''$  S., and long.  $37^{\circ} 23'$  W.

**RIO COTINDIBA.**—The outlet of this river is in lat.  $11^{\circ}$ , or about 5 leagues to the southward of the Rio Japarutuba. According to information given to Baron Roussin by the pilots of the coast, it is joined by many other small streams at a short distance from its entrance, and is too shallow to receive large vessels, there being only 6 or 7 feet on its bar; it is, however, much frequented by coasting vessels, on account of the numerous productions of the adjacent country, consisting principally of sugar, cotton, tobacco, &c. When approaching the bar, the mountain Aracajou will be perceived, situated a few leagues to the north-westward, and also the Morros de Telha to the westward; the first of these is rendered remarkable by its lengthened form, and by a gap at its northern extremity; and the second is equally distinguishable, being shaped like a cardinal's hat.

*Light*.—A fixed light, exhibited from a watch-tower at the bar, shows red to eastward, white to S.E., and green to southward. It is 115 feet above the sea, and visible 6 to 9 miles.

*Caution*.—Vessels with the white or green light in sight should not stand into less than 5 fathoms; and should anchor with the red light in sight, in 4 fathoms, fine sand and mud.

The river Cotindiba also bears the names of Cotinguiba and Maroim. On its banks and on those of its tributaries, are the towns or villages of Aracajou, Socorro, Bom Jesus, and St. Amaro: the latter is situated between the Serras de Coralinho and Itabayana, at 6 or 7 leagues from the sea.

In March, 1848, the following notification relative to the navigation of the river was published. It will be observed that the depth of water on the bar is represented to be about 16 feet at spring-tides, while it has been hitherto stated that there are only 7 feet; we may, in consequence, conclude that some considerable improvement has taken place in the state of the bar.

"The bar of Cotinguiba river is in lat.  $10^{\circ} 58'$ , or  $10^{\circ} 59'$  S., and vessels making the port should keep well to the north of the bar, as during the shipping season, from October to April, there is a very strong N.E. current down the coast. Vessels may close with the land until within soundings of 5 or 6 fathoms, when they will be 2 to 3 miles from the bar; and they should then hoist a signal at the fore for a pilot, who will proceed on board as soon as the tide turns for the ebb.

When in sight of the signal-post from the ship, the signals should be observed, as they are intended for a guide to vessels entering the port; and of their purport the following is an explanation:—

1st.—The upper flag hoisted alone is the signal that the vessel is seen from the shore.

2nd.—The lower flag, which is hoisted upon a moveable staff, denotes that the vessel should tack, either to the north or to the south, as indicated by the direction of the sloping flag-staff.

3rd.—Both flags being hoisted on the central flagstaff, one above the other, signifies that the vessel is in the right position off the bar, and that the tide is favourable for entering. The vessel should then steer direct for the signal-post on the beach, and the signals will remain flying even after the vessel has passed the bar.

4th.—If either one or both of the flags be hoisted and lowered again, it implies that the ship should stand off.

If the master of a ship has never been in the port before, he should not attempt to enter without a pilot, and should avail himself of the telegraph only in case of absolute necessity.

Long before the signal-post is visible, there is a chain of mountains that may be seen in clear weather. It is named *L'a Itabayana*, and is so denominated in the English charts. Its southernmost point is named, from its similarity in shape, the Cardinal's hat, and bears from the bar W.N.W.  $\frac{1}{2}$  W.

Coming from the northward, there may be seen a distant and solitary hill, named *Aracaju*, at the entrance of the river, which, when the vessel is about 2 or 3 miles E.S.E. of the bar, bears W.N.W.  $\frac{1}{2}$  N.

Coming from the southward, the bearings will be nearly the same, but great care must be taken not to enter the river *Vazabarris*, where the signals are very similar, and which is only 14 or 15 miles to the S.W. of the *Cotinguiba* bar. The bearings of the Cardinal's hat from the *Vazabarris* are N.W.  $\frac{1}{2}$  N., and the *Aracaju* is not visible.

There is good anchorage to the northward of the bar, in 6 or 7 fathoms, hard firm sand; but vessels should, if possible, always remain under way, and though they make the port too late for the pilot to come off that night, still they should hoist the signal at the fore, and stand out to sea, keeping well to the northward, where they will be sure to meet the pilot outside in the morning.

Vessels coming either from foreign or Brazilian ports should be very particular in being provided with all papers required by the authorities in any Brazilian port, as the custom-house is very strict, and in default of such, the usual fine will inevitably be levied according to the custom-house regulations.

The pilot-boat is a fore and aft schooner.

The depth of water in the channel on the bar is about 16 feet at spring-tides, but as vessels cannot get under way from the anchorage before the ebb begins, and as a good deal of time may be lost before they reach the bar, they ought not to draw more than 11 feet."

**Rio Vazabarris or Sergipe.\***—From the entrance of the Rio Cotindiba, the

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\* Sergipe del Rey is one of the smallest provinces of Brazil, as it extends only between the latitudes of 10° 28' and 11° 41'. The country is generally low and uneven, and in passing near the shore an abrupt bank of reddish rock and sand is visible. A dense jungle covers the soil, on which there is rarely to be seen any appearance of cultivation. About 20 miles inland is the Serra de Itabaia, a range of low mountains, on which grows the Brazil wood and other valuable trees. Occasionally openings appear on the sides of the Serra, which are said to be used as slides for the timber which is cut and exported. This Serra divides the forest country of the sea-coast from the open plains in the interior.

The province is but thinly inhabited, and contains no city of any magnitude. Its capital is named San Christovao, after Christovao de Barros, under whom, by order of King Philip II, the conquest of the country was first made, in 1590. The name Sergipe is derived from the Indian appellation of a small river running through the interior. The eastern portion of the province is adapted to the cultivation of sugar, tobacco, and other kindred products, while the western is devoted chiefly to the rearing of cattle. (*Kidder*, 1845)

coast runs about 10 miles to the south-westward to the Rio Sergipe, and continues to bear much the same appearance as that to the north of that river. When sailing along this part of the coast, three small hills will be observed at about 3 leagues to the south-westward of the river's entrance; being similar to each other in size, and covered with bushes, they are named *Tres Irmaes*, or *The Three Brothers*. According to the pilots, the town of Sergipe is built at the foot of these hills, upon one of the branches of the river which takes its name.

The entrance of the Rio Sergipe is formed on the south side by a sandy point, not so low as that at the entrance of the Rio Real; but the whiteness of the sand of which it is composed, equally distinguishes it from the verdure of the neighbouring low lands. It is surrounded, like its northern point, by violent breakers, which render its entrance the more difficult, as the channel has not above 10 or 12 feet water in it under the most favourable circumstances.

Of Sergipe bay, Pimentel says,—“At all seasons the sea rolls in most furiously, more especially when the wind sets upon the coast: it is accordingly always considered dangerous, and should be avoided by keeping out to seaward.”

**Rio Real.**—At about 7 leagues south-west from Sergipe river is the entrance to the Rio Real, which, when viewed from the sea, does not present any object particularly remarkable; but, like the other rivers on the coast of Brazil, the sea breaks stronger there than it does on the adjacent shore. The southern point of the entrance named *Mango Seco*, is the continuation of the flat shore of white sand, known by the coasters as *Prancha de Rio Real*. The pilots say that, within the bar, the river runs south-westward, and is joined by several other streams.

When at about 2 miles outside the entrance to the river, a number of huts will become visible in the vicinity of the bar. The depth on the bar is stated to be generally about 15 feet at high spring-tides, but this is uncertain, as our information respecting the river is very imperfect. The swell is very heavy, and the passage always dangerous, so that it should be attempted only by the boats and pilots of the country.

Of the coast of Brazil between the Rio San Francisco and the Rio Real, it may be described as consisting mostly of a low sandy shore, interspersed with bushes, and broken by little wooded hills. It is in general so safe, that in sailing along vessels may almost touch the ridges of the rocks on the coast; the soundings also are so deep that, from 2 to 10 miles off, the depth varies from 10 to 30 fathoms, on mud, sand, and broken madrepore, this last quality of the bottom being commonly found further from the shore than the other.

**Rio Itapicuru.**—The entrance to this river lies about 20 miles southward of that of the Rio Real. It is a stream of comparatively little importance, there being no place of sufficient commerce on its banks to render it much frequented, besides which, the depth on the bar at high tides being only 7 or 8 feet, no ships of large tonnage can enter. The entrance is also represented to be encumbered with breakers, so that the passage through it is dangerous; it is consequently only visited in the floating raft so common in the country. When approaching, there are no objects on shore that can be used as leading marks; it will, however, be noticed that the land rises in the west and shows the downs a little higher than those to the right or left. On the southern side of the mouth of the river there is a village, and another on its banks at a short distance inland.

From the Rio Itapicuru to Bahia the distance is about 97 miles, the inter-

mediate coast having a south-westerly direction. In proceeding to the southward, a series of small hills, named the Oiteros de San Miguel, will be noticed at a little behind the shore, their northern part being 6 or 7 miles from the Itapicuru; after these there is nothing remarkable for a distance of 20 leagues, except the Morro Massurandupio, a small mountain about 10 miles inland, situated a few miles N.W. from the tower of Garcia d'Avilar; there are, however, a few rivulets named Tariri, Inhanbupe, Sabahuma, and Massai, but they are of no importance whatever. On the southern bank of the Inhanbupe there is a small village, having near it a hill; but there is no other object by which the coast may be recognised.

The tower of Garcia d'Avilar, in lat.  $12^{\circ} 32'$ , is a kind of fortress erected on the summit of the coast, and surrounded by trees: on it there is or was a signal-post. Opposite this tower is a sort of bay, of little importance although called port Avarji. The shore now runs S.W., for 11 leagues, so far as point Itapua. All this coast may be approached to the distance of a mile in 12 and 15 fathoms water, on a bottom of muddy sand and broken madrepora, and it should be observed that the depth increases so rapidly to seaward, that, at the distance of 10 miles, the ground cannot be reached with a line of 40 fathoms. When sailing along the land, at the distance of 6 or 8 miles, there are no other visible openings than the mouth of the little rivulets Jacuhipé and San Joannes, which are entirely obstructed by breakers. From point Itapua, the course of the land to the northward is N.E., with scarcely any perceptible inflexion for the length of more than 30 leagues: the shore is terminated by the band or reef of rocks already described; many of these rocks are above water at all periods of the tide, and have much the appearance of islands: that which terminates point Itapua is detached from the land in a very visible manner. In passing from Avilar towards point Itapua, some villages will be seen near the shore, and also several signal staffs.

**Itapua Point Light.**—A *fixed white* light is exhibited from a round tower on Piraboca rock, (a cable from the shore,) Itapua point. It is elevated 68 feet above the sea, visible 14 miles. Position, lat.  $12^{\circ} 58'$  S., long.  $38^{\circ} 21'$  W.

From point Itapua the land turns W. by S. so far as point Itapuanzinho; as point San Antonio is approached the aspect changes, and the white sand-downs, chequered with bushes and cocoa trees, and bordered with the *recife*, are no longer seen.

The total distance between Pernambuco and point San Antonio is 376 miles, and the mean direction about S.W.  $\frac{1}{4}$  S. (*true*).

**BAHIA**;—Bahia, with the exception of Pernambuco, is perhaps the most important port of Brazil. It is formed on the west by Itaparica island, and on the east by the peninsula on which stands the city of San Salvador, now more generally known as Bahia. Within these limits the land bends inwards, and expands into an extensive gulf or sea, bearing the name of Reconcavo, into which several large rivers fall. Few foreign vessels enter the port past the city, the usual place of anchorage being immediately off the town; there is, however, deep water over nearly the whole of its surface, and there are but few dangers which may not be avoided by the exercise of ordinary precaution and attention to a frequent use of the lead. The bay is in all about 20 miles in extent, and its entrance opposite to the city is about  $4\frac{1}{2}$  miles wide from shore to shore; but in consequence of extensive shoals extending off Itaparica island the entrance channel is really only about  $2\frac{1}{2}$  miles wide.

**Itaparica Island**, on the western side of entrance to Bahia, is about 18 miles

long and 5 miles wide, and is estimated to have a population of about 18,000 people. The principal town, at its northern end, is not a large place, but it carries on a brisk trade, and is the general mart of the island; it is also the usual place of resort to the launches which frequent the various inlets and creeks of the bay, and being not very far from Bahia a frequent communication is kept up with that city.

The shore of Itaparica should be approached very cautiously because it is skirted on its eastern side by a reef, which extends in some parts 2 to 3 miles from the coast, and is steep-to; from the southern end of the island a dangerous rocky shoal also extends off a considerable distance, rendering a near approach to that shore unadvisable. The passage between the island and the western coast, named Itaparica channel, is narrow, but capable of being navigated by small vessels; it is frequently used by the coasters, whose masters, being well acquainted with the shoals and other difficulties in the way, prefer that passage into the bay to the more open passage east of the island. The depth on the Barra Falsa (the southern entrance to the channel) is only 9 feet at *high* water. (1867). Along the shore south of the island, to the distance of some miles, there are a number of small islets or reefs, within which coasters frequently traverse, as they thus avoid the rough sea outside.\*

*Eastern side of Bahia Harbour.*—When approaching Bahia it will be noticed that the land on the eastern side of the harbour, that on which the city is built, is much higher than that of Itaparica, the opposite side of the bay. It will also be observed to be covered with trees and verdure. In the vicinity of point San Antonio the country is so lofty that it may be seen in clear weather 30 miles off.

After passing the point the church and villas of Victoria will be observed on the high land overlooking the harbour, and at the same time the city itself will come into view.

The city of *San Salvador, or Bahia*, is built partly along the ridge, and partly on the declivity of a very high and steep hill fronting the entrance to the bay. It consequently consists of an upper and a lower town, the *Citada Alta*, which includes the suburbs of Bom Fim and Victoria and the *Praya* or *Citada Baixa*, the latter consisting principally of one street, nearly 4 miles long, in which are located the magazines and warehouses for inland produce and foreign goods. The upper town stands on the ridge between the sea and a lake on the north, and contains several fine streets, in which reside the principal inhabitants of the city. The lower town, on the contrary, has very narrow streets, and is extremely dirty.

The town and shipping are defended by several forts and batteries. Near point San Antonio there is a small bay and sandy beach, having behind it fort Cabo, or Santa Maria, and the circular battery of St. Diego. At the south-west extremity of the city is fort Gamboa, and beyond this is the battery of San Phillip. There are other smaller batteries on the beach, and a small one on the

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\* Mr. Kidder has remarked, that "so similar is the appearance of the coast in the vicinity of the Barra Falsa to that about the real entrance to the harbour, that when seen from a short distance at sea, even those accustomed to the port are often deceived by the resemblance. This was the case with our captain for a short time, but not long enough to cause any material deviation from his proper course."

projecting point more to the north, named Montserrat. On the land side the city is defended by three forts, and by other fortifications.

The principal fort is, however, the fort Do Mar, from which a *fixed red* light is exhibited. It stands on a small rocky bank fronting the town at about three-quarters of a mile from the shore. It was usual for the signals made at point San Antonio in reference to vessels entering the harbour to be repeated from this fort and we believe that the custom is retained.

**San Antonio Light.**—The light at point San Antonio *revolves* in 80 seconds, showing *white* and *red* flashing alternately, in the order of twice white and once red; it is elevated 140 feet above the sea, and visible about 18 miles. Its approximate geographical position is lat.  $13^{\circ} 0' 55''$  S., long.  $38^{\circ} 31' 44''$  W.

**Directions.**—The principal danger in entering the harbour of Bahia is the San Antonio bank,\* an irregularly-shaped shoal lying outside the entrance, in the direction of S.  $\frac{1}{2}$  E. (*true*) from cape San Antonio. It extends nearly north and south about 4 miles, and is narrow, being in some places not more than a quarter of a mile wide. On it the depth is  $3\frac{1}{2}$  to 4 fathoms, red sand and coral, but on its eastern edge, 3 miles S.S.E. (*true*) from San Antonio lighthouse, is a small patch of 13 feet, and at its southern end a patch of only 3 fathoms. The sea breaks over it in some places during strong wind; at such times its position is consequently pretty well defined. As the bank is steep-to, and may have spots on it of less water than those mentioned yet undiscovered, it will be most prudent for a large vessel carefully to avoid it.

Baron Roussin says of the bank San Antonio, in 1810,—“It is not difficult to avoid, nor is it very dangerous. It is composed of red sand mixed with madrepore, upon which we believe there are no rocks: the least depth we found was 4 fathoms, and no one told us there was less water upon it: this also was the opinion of our pilot, *Manuel Madeiros*, who was one of the best in the country. Nevertheless, though we took numerous soundings, we did not explore all the space comprised between the southern limits of the bank and the adjacent shore; and as the sea breaks over many parts of this bank, when the wind is high, possibly there may be some few soundings upon it of less water: we therefore advise the mariner not to run any risk by going within the limits we prescribe to the bank; and it will always be advisable to give it a good berth with a large vessel.

In circumscribing the bank in 7 fathoms water, its southern limit will be the parallel of  $13^{\circ} 54'$  S.; its western side will bear from fort San Antonio S.  $12^{\circ}$  W., and its eastern side S.  $29^{\circ}$  E. from the same fort (*true bearings*). These will be sufficient directions for the mariner to avoid the bank when coming from seaward.”

The passage between the north end of the shoal and the shore is about half a mile wide, and 7 to 9 fathoms deep; it is consequently frequently used when the wind is favourable, but at other times it is not so convenient on account of the high land of point San Antonio, which sometimes causes a baffling wind.

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\* In 1869 the north extremity of San Antonio bank was guarded by a *black* buoy moored in  $3\frac{1}{2}$  fathoms; and the south end was pointed out by a *red* buoy in 4 fathoms. In reference to these buoys the Commander of the German corvette *Albatross* reports (1874):—“The buoy on the north end of San Antonio bank is *red* instead of black, and is much too small for a good sea mark. The buoy on the south end was not seen.”

Its chief advantage is, that it affords a short, and in favourable circumstances, an easy passage into Bahia.

The usual course for vessels entering Bahia is to pass southward of the bank, as the wind generally enables them to steer direct for the town on one tack. When passing round its southern end, the depth at one or two miles eastward of the bank will be 35 to 20 fathoms, and at that distance westward of it 16 to 17 fathoms. The bottom in its vicinity is generally a mixture of sand, coral, and coarse gravel. Mud is found in the N.E. only, on approaching the land. At three leagues from the coast, with point San Antonio bearing North to N.N.W., the depth is not more than 40 fathoms, and a little further off, in the same direction, no soundings have yet been obtained.

At the entrance to the harbour the depths are from 14 to 16 fathoms, within half a mile of the eastern shore, whence it deepens to 18 or 20 fathoms westward, until about two-thirds across, further than which heavy ships ought not to stand.

Off the eastern coast of Itaparica island and facing the town of Bahia the reefs extend about a mile from shore, and at a cable outside them the depth is 5 to 6 fathoms; eastward of this depth and nearly 2 miles from Itaparica a dangerous bank known as the Baixo Grande extends in a northerly and southerly direction about 2 miles, on many parts of which the depth is only  $1\frac{1}{2}$  fathoms. Outside this bank, near its southern extremity, is a coral patch with  $4\frac{1}{2}$  fathoms water on it and 7 fathoms close-to, known as the Pedra Baixo Grande.

Within the harbour, nearly opposite to fort Do Mar, there is a shoal of foul ground, known as the Panella reef. It is about half a mile in length, and has on it in some places only 3 fathoms at three-quarters ebb, but on other parts there are 4 fathoms rocky bottom. Its centre bears from fort Do Mar W.N.W.  $\frac{1}{2}$  W. distant three-quarters of a mile. Around this shoal there is good anchorage;—between it and fort Do Mar in 5 or 6 fathoms; without it in 8 or 10 fathoms; above it in 6 or 7 fathoms; and below it, in the same depth, on good ground. Small vessels generally lie between the city and fort Do Mar.

A shoal with only  $2\frac{1}{2}$  fathoms water on it and 4 fathoms round it lies north-eastward half a mile from fort Do Mar; it is about 4 cables in extent east and west and its outer extremity is distant 8 cables from the shore.

Baron Roussin says, "vessels during the *southern monsoon* commonly make for the Morro San Paulo, but in the *northern monsoon* it will be proper to make the land some leagues to the northward of point Itapua, which lies a little to the northward of point San Antonio. The importance of this precaution, in both cases, will greatly depend upon the correctness of the reckoning, and the direction of the wind at the time of your landfall.

If vessels steer from the Morro San Paulo N.  $46^{\circ}$  E. (*true*), they will clear all the shoals of Itaparica, and pass San Antonio bank at a proper distance; but if they are obliged to work up, they must take some care to avoid both. Vessels will have nothing to fear from the first, if they keep 5 miles from the coast of the continent in the vicinity of the Morro San Paulo, and at a similar distance from Itaparica, until they bring point Jabaru, which is the most easterly point of the island, to bear due North. Having done this, and being 7 miles from the above point, they will be 5 miles S.  $41^{\circ}$  W. (*true*) from cape San Antonio, and about a league westward of the southern extremity of the shoal of that name; then steer towards the cape, until half a mile from it, after which make for the

church of Bom Fim, upon the peninsula of Montserrat, until within a short distance of fort Do Mar, near which is the usual anchorage."

The best anchorage for ships of war is in 7 to 8 fathoms, with fort Do Mar bearing N. 73° E., and Montserrat fort N. 28° W., at about a mile from the city. From this spot they will be able to get clear out, with the very light morning winds, as the ebb-tide sets strongly towards forts Cabo and San Antonio.

The watering-place is at a short distance from the south end of the town, between it and fort Gamboa; off the latter a shoal extends outwards about one-third of a mile. It has only 10 feet over it at 3 cables from shore, hard sandy bottom. In 1841, its edge was marked by a red buoy moored in 2½ fathoms, at low water.

Baron Roussin says, in 1827,—“The best part of the anchorage for men-of-war is off the obelisk in the public garden: moor in the direction of N.N.E. and S.S.W., which is that of both flood and ebb.

It is very seldom that the regular winds during the day prevent a vessel coming to an anchor before the city; the most common, those from the East and S.E., will always conduct a vessel by tacking. During the night the breezes come from different points of the horizon, but principally from the land-side; if they are strong enough to permit tacking about, mariners must consider whether they are sufficiently acquainted with the bay to enter in this manner.

At the fort Do Mar it is high water, full and change, at 4h. 26m. The rise of spring-tides is 8 feet, and of neaps 3 feet. The common flow of the tides is regular. There velocity does not commonly exceed 1½ miles an hour; but at spring-tides it sometimes increases to 2½ miles.

The bay of San Salvador affords a sure shelter; in the common road the sea does not undergo any great agitation during the greatest part of the year. The winds from South round by east to North, or those which most frequently prevail, are always weakened by the heights under which the vessels are anchored; and the land-breezes have hardly any strength.

In the southern monsoon alone, and principally during the months of July, August, and September, the winds occasionally veer to the south-westward, and penetrating into the bay, cause a great swell, which is very troublesome, especially at the return of the tide. But these circumstances are not lasting; they most commonly happen at the new and full of the moon, and do not continue above three or four days successively.

Vessels at Bahia may obtain every requisite they stand in need of; they may be careened, remasted, and all kinds of damages repaired; but labour is very dear here, as well as at every other port in the Brazils.

In the fine season the anchorage at the west part of the town will enable a vessel to make all sorts of repairs; but during the bad part of the year, it will be advisable to go up to Tapagipe, which is a little to the eastward of Montserrat, where the water is as smooth as in a basin. Fresh water on many parts of the interior of the coast is good, and easily procured, either near the fort of Gombo, under the public gardens, or at a little distance to the northward of the Marine Arsenal; but when a number of vessels are assembled, it will be better to get water at Tapagipe, especially if much is required. Fuel is plentiful, and charcoal in abundance. Provisions may be obtained at nearly the same prices as at Rio Janeiro: these consist principally of cattle, farina, Indian corn, brandy, poultry, pigs, dried fish, fruits, and vegetables belonging to the tropical climate.

*To sail from Bahia*:—The route for leaving Bahia has been sufficiently pointed

Out by what has been directed for entering. Vessels should coast along the land at half a mile or a mile distance until abreast the lighthouse of point San Antonio, in which track they will have from 9 to 20 fathoms, or by keeping at a greater distance, the water will deepen from 28 to 30 fathoms. When nearly a mile westward of this point they should steer about S.S.W.  $4\frac{1}{2}$  miles, and then proceed with a good depth along to the south end of the bank of San Antonio, after which the vessel's head may without danger be brought to bear East. The bank may be rounded in from 13 to 24 fathoms, at a little distance from its southern edge; and at one or two miles to the eastward of it, the depth is regular from 20 to 40 fathoms.

All the land which composes the promontory terminated by point San Antonio is rather elevated, compared with that on the opposite side of the bay; it has an agreeable appearance, in consequence of the green trees and verdure with which it is covered, and it may be seen, when the weather is clear, fully 10 leagues off. The western part of the point is distinguished at night by a lighthouse, built on the southernmost fort, as already noticed. In the daytime when seen to the westward, the fort of San Antonio appears to be separated from the land by a little interval.

At  $2\frac{1}{2}$  miles East a few degrees South from the lighthouse, another point will be observed on which stands a signal, which transmits to Bahia a semaphoric correspondence from the North: this is the most southern point of the promontory, and forms, with that of Itapuanzinho, which is situated about a mile to the eastward, a little bay occupied by an Armacao, and defended by rocks similar to those which environ the whole coast. Many houses are situated about the cape, but the landing is difficult."

Captain Horsburgh has remarked of Bahia,—“This port is sometimes visited by outward-bound East India ships in want of refreshments; but its situation being nearly in the middle of the S.E. trade, navigators are cautious of touching here, thinking that they may afterwards find it difficult to get to the southward, on account of adverse southerly winds, supposed to blow along the coast from March to September; but the East India ships have seldom found any difficulty in getting from this port to the southward, even in the most unfavourable months, June, July, and August; for the wind generally draws well to the eastward here, and more so as you proceed to the southward.”

Captain Hewitt, R.N. says,—“Between September and March the winds generally prevail from N. by E. to N.N.E.; and between March and September from E. by N. to E.S.E., but are influenced by the proximity and temperature of the land. About the equinoxes, especially when the sun is advancing to the northward, calms and variable light winds are experienced near the coast, particularly between the Abrolhos and cape Frio.”

Commander F.L. Barnard R.N., in some remarks upon making Bahia (1854), says,—“Bahia lighthouse should be made, if possible, from the southward, as it is shut in by a hill with a signal-post a few miles to the eastward of it, and cannot be seen until brought to bear N.N.W.”

If to the northward, the land will show out with sandy hillocks and long patches of white sand, looking in the distance like buildings. The extreme point to the southward will at first appear like detached trees, until a mound like a round island rises; on the other side of this is the lighthouse. The cathedral will be seen long before the lighthouse, between the openings in the forests.

About 10 miles to the northward of the point, where the land begins to trend to the westward, is a large barracoön, or factory, close to the beach."

**Additional Instructions.**—The following additional instructions for the port of Bahia, are by Captain E. G. Dent, of the *Cambrian*, 1854.

"The usual track to Bahia is to cross the Equator between 27° and 30° W., according to the season—some of the quickest passages having been made within those limits. Many of the regular traders make it a general rule, even in the time of the Souths (between March and September), to cross in not less than 28° W. Ordinary sailing vessels following the above track have beaten much faster ships that have kept more to the eastward, and which left England at the same time.

About S.  $\frac{1}{2}$  E., 4 $\frac{1}{2}$  miles from point San Antonio, is the southern extreme of San Antonio bank, composed of sand and coral; the least depth on it at low tide is 13 feet; between the bank and the shore is a channel about half a mile wide. A stranger going into Bahia should give the lighthouse a berth of 5 miles, until it bears N. by E., and then haul up for the anchorage, which he will generally be able to fetch in one board.

Upon arrival, vessels generally anchor about a mile S.W. of fort Do Mar, till visited by the proper officers, when seals are placed upon the hatches, and a berth in the discharging-ground is then pointed out for the vessel to remove into.

Captains proceeding to Bahia, or any of the Brazilian ports, must be careful to obtain, in addition to the usual manifest of cargo, an attested one by the Brazilian Consul at the port of loading, otherwise a heavy fine is inflicted. A vessel in ballast must produce a manifest in accordance with the above regulation, and if there is not a Brazilian Consul, it must be signed and attested by two resident merchants at the port from which she has arrived.

The discharging-ground is between two imaginary lines running W. by S. from the fort Do Mar and the Consulado, and extending about a mile off-shore. The leading-ground is northward of the above. The space between fort Do Mar and the guard-ship, which is anchored S.W. of the fort, is known as Franquia, in which vessels must remain twenty-four hours before their final departure, previous to which both vessels and papers are examined by an officer from the guard-ship, the signal for whom is the national colours at the main. The national colours at the main, while lying in the loading or discharging-grounds, is a signal for the sick-boat, which is constantly rowing round the shipping during the day, for the conveyance of the sick to Montserrat hospital. After the examination of ship and papers by the proper officers, no further communication with the shore is allowed, and if the vessel does not leave before sunset, a second examination is taken before she is allowed to proceed. Upon clearing out, care must be taken to have everything on board before leaving the loading-ground for Franquia, nothing being allowed to be taken on board afterwards. Captains taking off even a few fowls, in their own boat, subject themselves to a fine, and their boat to confiscation.

With the exception of fresh meat, vegetables, and fruit, the charges for everything are very high, particularly for naval stores. Lighters, constructed for the purpose, with every necessary for heaving ships down for repairs, are moored in-shore off the loading-ground. An American clipper ship (*Queen of Clippers*), 2400 tons, from Callao, was hove down and caulked there in April last (1854).

The Custom-house hours for discharging coals are from 7 A.M. to 3 P.M.; for general cargoes, from 7 to 11 A.M. only, as the goods are examined at the

Custom-house the day they are landed. An officer is sent on board during the discharge, who unseals the hatches, tallies the cargo, and seals the hatches up again when leaving. The persons so employed are changed every day. Persons from the shore are not allowed on board of ships in harbour, either on business or pleasure, without a permit from the Custom-house; neither is visiting allowed between crews of vessels.

Crank ships that will not stand without ballast are occasionally allowed to take in part of the homeward cargo, to stiffen them, before the outward cargo is discharged; but it depends entirely upon the whim or caprice of the principal of the Custom-house. Generally the lower yards and topmasts have to be struck, and the vessel afterwards ballasted, if necessary, before they allow the homeward cargo to be taken on board.

In Bahia charter-parties the question of lighterage is evaded (a serious item in a ship's account, as it generally averages from  $4\frac{1}{4}$  to 5 per cent. upon the gross freight); consignees charge it, pleading custom for so doing. Captains submit to it to prevent detention, and hasten their departure from a sickly port. But from the wording of their printed charter-parties, which are all alike, I very much doubt their being compelled to pay it, if taken into a court of law. Formerly a charge was made upon shipping for breaking out and marking the cargoes, but the custom is now abolished.

The cargo is considered to be in charge of the commander of the vessel for which it is destined, upon leaving the wharf in the lighters, and should any of it be lost between the ship and the shore it is charged to the ship's account. The charge for stowing (stevedores finding and paying their own men), is as follows:—Sugar in cases, 180 reis per case; ditto in bags, 20 reis per bag; coffee and cocoa in bags, 20 reis per bag; rosewood, 970 reis per doz.; hides, 18 reis each; piassava, 8 reis per double bundle.

The ordinary expenses of a vessel discharging and loading a cargo in the port, commissions included, would not be less than £1 per register ton. The currency is in reis and milreis; the average exchange being 2s.  $3\frac{1}{4}$ d. per milrei.

About midway between the Custom-house and Consulado, and near the water-side, is the site of the new market, which is well supplied with poultry, fish, fruit vegetables, &c.

Long detentions often occur for want of seamen; should Brazilians have to be engaged, the wages paid must be very high, and guarantees given for the payment of their passage back. In the event of the death of captain and mate, the charge for a Brazilian or Portuguese to navigate the vessel home is generally very heavy—as much as £120 having been paid for the purpose.

As a port of call for outward-bound Australian ships in want of water, Bahia is to be recommended, it being an easy matter to get in or out without pilots. Supplies can be quickly and readily obtained, and for the short time the vessel would lie in the outer roads, there would not be much likelihood of catching the fever; nor need any fear be entertained about getting to the southward afterwards, as even in the time of the souths, the wind is rarely to the southward of E.S.E."

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## BAHIA TO THE ABROLHOS ISLETS.

**Morro Sao Paolo and Light.**—The Morro Sao Paolo is distant from point San Antonio about 80 miles on a S.W. by W. bearing, and is estimated to be in latitude  $18^{\circ} 21' 53''$  S. Although separated by so wide an interval, the land of both promontories are sufficiently elevated to be visible from each other in fine weather. On the point or Morro there is a lighthouse, which shows a light *revolving* every minute, visible 20 miles. The lantern is about 276 feet above the sea, and the light appears bright for 15 seconds followed by an eclipse which lasts 45 seconds. At a less distance than 8 miles the eclipses are not total.

The Morro Sao Paolo forms the eastern point of the Rio Una, a small stream said to be navigable only by the native craft. It is of little height, but is rendered somewhat remarkable by being backed and followed to the northward by land lower than itself, and by having, on its northern extremity, some cocoa-nut trees, divided into two groups, which are very distinct from the surrounding land. The hummock terminating the Morro to the north, presents, on the side nearest the sea, some large white spots, which are visible 8 leagues in clear weather; these, when viewed from a short distance, stand out in striking contrast with the surrounding verdure.

At 2 miles east of the Morro Sao Paolo there is anchorage in 17 fathoms, on an excellent bottom of mud. At 6 leagues off, in the same direction, there is no bottom although sounding with a line of 80 fathoms.

From the Morro Sao Paolo to the northward, the coast is very low, sandy, and bordered by reefs, as already noticed in describing Bahia. It forms, with Itaparica island, a deep bay, into which it is not considered prudent for vessels to venture very far, on account of the reefs fronting the channel between Itaparica and the shore.\*

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\* A good survey of the coast between Bahia harbour and the Morro Sao Paolo is very much needed as the descriptions we have of it are very imperfect. The following is a copy of some remarks appended to the official notification of the establishment of the light on the Morro, which cannot but prove useful to those bound to Bahia:—

“From the Morro towards the north, a bay, bordered with rocks, is formed, and the western point of the island of Itaparica, with the main land, forms the bar of Jaguaripe, to which the existing hydrographical charts improperly give the name of Barra Falsa, the same being a small inlet of the island to the east of that bar, formed by the point of Aratuba; and another which is further to the north, which, at a distance of more than 14 miles, has a similar configuration to the point of San Antonio, appearing like the latter, to detach itself from the land which lies to the westward of it. Even in the daytime these places ought not to be approached nearer by vessels at a less depth of water than 11 fathoms, if they have no pilot on board; those which sight from the south the lighthouse of the Morro Sao Paolo, and wish to remain in sight of Bahia, ought not to pass to the N.W. of the line N.E. (S.W. *true*) of the lighthouse) as long as they are to the south of Itaparica; and for greater caution, ought to sound and veer the ship to the south as soon

In proceeding to Bahia from a berth a short distance off the Morro, vessels may steer about N.E. without danger, as there is ample depth of water. The soundings are 34 to 12 fathoms on a bottom of mud, sand, gravel, and coral, and this course will lead at a convenient distance, between the banks to the southward of Itaparica and that of San Antonio. Large vessels should not go N.W. of this line, while to the southward of Itaparica; and, if the wind blows strongly on the coast, they should keep outside until certain of being on the meridian of the point Jabura, the east point of that island, which will be known by the depth being above 11 or 12 fathoms.

If necessary to work to windward, it will be advisable to go no nearer than 5 miles to the coast of the continent, when to the southward of Itaparica, and to keep at the same distance from the island until point Jabura bears North. With this point bearing North, and at 7 miles from it, cape San Antonio will bear N. 41° E. (*true*), distant 5 miles, and the south extremity of the bank off the cape, about a league to the eastward; thence a course may be shaped for the cape until within half a mile of its shore, and then another direct for the church of Bom Fim, on Montserrat, until abreast fort Do Mar, near which is the ordinary anchorage.

**Rio Una.**—This river falls into the sea on the west side of the Morro Sao Paolo. It is but little known, being seldom visited except by the native craft; and accounts of its capabilities differ, some stating that it is too shallow for any but the smallest vessels, while others say that it forms a good harbour. Its western shore is low and sandy, and said to be bordered by a sand-bank more than a mile broad on the outer part, but diminishing inward to a point, to 2½ miles W.N.W. from the Morro, where the river is about nine-tenths of a mile broad. On this line of direction the soundings, on clean and good ground, are represented as varying from 4½ to 5, 6, 7, 8, and 9 fathoms. It is also said that there is

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as they find 11 fathoms in depth, by which they will avoid nearing the shoals and rocks of the point of Caixapregos, Barra Falsa, and others which, on the eastern side, encircle that island, which at night, are so much more to be feared when the strong sea-winds drive the waters into the bay,—besides which, in some places at 10 fathoms the depth diminishes rapidly. If, on finding a lesser depth than 11 fathoms, it appears the vessel is not to the N.E. of the line N.W. (?) (S.W. of the lighthouse), there must be a defect in the compasses, and never hesitate to tack to the south. At a distance of 13 or 14 miles from the point of San Antonio, the light of the bar of Bahia begins to be seen as a faint light, showing distinctly its different colours at about a distance of 6 miles.

The entrance of the Port of the Morro is open for vessels of all descriptions, taking notice that at a mile to the westward of the fort runs a shoal up the Rio Una, and whose depth goes gradually diminishing on the side of the shoal, and to which the hill on the eastern side runs, lengthened by a ridge of rocks called 'Coitas,' which runs out into the sea for 180 fathoms, more or less, with a depth of 8 fathoms in some places near them. Against these, care must be taken in the night time by those who are tacking in to fetch the anchorage. By day, the breakers on these ridges of rock are very visible. Two miles distant from the shore of the Morro Sao Paolo, and from thence towards the south, with the lighthouse in sight, is an open passage for any kind of vessel, and those that wish to enter the port by it, can come near the hill by the northern side as far as the depth of the soundings will allow, and the open anchorage begins at the point of the fort up to a mile onward. A pilot ought to be taken by those who wish to ascend the river, where there is a sheltered anchorage for a squadron."

anchorage, sheltered by the high lands to the eastward, with the Morro bearing about E. by N., distant about a mile. The landing-place is half a mile within the Morro, in a small bay, within which is a village, protected by batteries, and having a red projecting cliff on the west.

In following the coast to the southward from the Morro Sao Paulo, a small islet named Tinharé will be observed close in by the shore. Its length from East to West is about a third of a mile, and it is surrounded by foul ground; breakers also extend from it towards the N.E.

South of Tinharé islet is a small rivulet, and beyond this an islet named Tupiassu. The land thence bends somewhat westerly, the shores being low and sandy, with a rivulet in the middle of a bay, which Pimentel calls Sobreaguades bay. In entering this river his advice is to keep the starboard land close on board, on account of the opposite side being so full of dangers. A reef runs out from the north-east end of Boypeda island, and the shores southward are rocky and dangerous, particularly the Morreira reef. A little southward of Boypeda island is the Serinhem river, which according to Pimentel, is broad, but encumbered with many shoals, so that no one can navigate it without a pilot; the great bar is, or was, fortified. The next river of consequence south of the Serinhem river is the Camamu.

**Rio Camamu.**—Point dos Castelhanos, on the eastern side of the entrance to the Rio Camamu, is in lat.  $13^{\circ} 55'$ ; it is part of an elevated land which is terminated on the north side by a headland of lower elevation, named point Muta. Off this latter point, distant 2 miles in a northerly direction, there is a small island named Quiepe, which is surrounded by rocks. This island, with point Muta and the adjacent coast, forms between them a small basin, into which the Rio Acarahy falls. At the outlet of this river there is a small town named Camamu, hence the river is more generally known by that name. The bay is rendered difficult of access by breakers at the entrance; it is consequently resorted to only by small vessels whose masters are well acquainted with the navigation.

At point Muta the coast appears to divide when viewed from northward, and to present the appearance of two islands. This is caused by some small hills, which are separated from each other by low land. This singular appearance continues as far as Morro Sao Paulo.

**Rio Contas.**—From point Muta the coast trends about S. by W. 25 miles to the Rio Contas, the entrance to which is very apparent when approaching from seaward. The southern point of the river is high, and covered with trees, and as the river becomes open a small town will be observed. Pimentel says, that from point Castelhanos to the Rio Contas the shore is covered with mangroves, which continue to some high land, and terminate at a white rock, this being the southern point of the Rio Contas: he also says that the river is narrow, and full of sunken rocks, so that none but boats can enter. According to the pilots, there is a rock, known as Pedra Branca, before the entrance to the river, which on entering must be carefully avoided.

**OS ILHEOS.**—About 30 miles southward of the Rio Contas are the fort and town of Sao Jorge dos Ilheos, which are situated on the southern part of a bay of that name, and are scarcely distinguishable from sea, although the town is the capital of a province. Two islands, lying at a little distance from the coast, form with the shore a shelter for the small vessels which resort to this anchorage. The most northerly of these islands is only a mass of rock, which the sea almost

always breaks over; the other is covered with thickets of trees, and divided into two parts, bearing N.E. and S.W. At 3 miles eastward of the islands there are 20 fathoms, muddy ground.

In running down the coast from the Rio Camamu to Sao Jorge dos Ilheos, the direction of the land from point Castelhanos is South a little westerly. The distance is about 57 miles, and the shore is perfectly safe, so that the largest vessels may sail along it if they do not approach nearer than 2 miles. In this extent of coast many small creeks and rivulets fall into the sea, but the Rio Contas is the only one of any importance, even to the coasters. A village stands upon the shore, about 4 miles northward of Sao Jorge, near which runs the little river Itahipe; and south-eastward of Sao Jorge is the entrance to the Rio Cachoeira, between the point of which and Os Ilheos there are several rocks under water, rendering the southern channel dangerous and intricate.

Pimentel, the old Portuguese hydrographer, has described this part of the coast as follows:—

“The Ilheos are two islands resembling at a distance two cardinals’ hats; they are about 3 miles from the land, and one is covered with trees, while the other is bare. In a southerly direction from them, a reef of rocks extends some distance, so that the passage that way is hazardous; but to the northward of them the channel is good. Between the islands and the main vessels may anchor in 6 fathoms, muddy bottom. Opposite to the islands there is a river, which, within, divides into several branches; vessels ought not to enter without a pilot.

When approaching from sea, during the months from March to September, and wishing to run for the islands, get into latitude  $15^{\circ} 30' S.$ , and make the land on this parallel; as the Aymores mountains will soon be observed; then run on north for the islands; the coast is clear of danger. From September to March, endeavour to make the land in  $14^{\circ} S.$ ; the land of Camamu will then be seen which is covered with thick mangroves: having made this, run on southerly, and observe the directions given above.

From point Zambo, the southern point of Ilheos river, the shores become hilly as far as the Rio Commandatuba. In sailing along the land, vessels will pass the small rivers of D’Una, Juzia, Poxim, Patipe, and arrive at the Rio Grande, which last has three bars or entrances; but none of these rivers will admit any but small craft.

The shoals of San Antonio commence about the entrance of the Rio Grande, and many of them are above water. Keeping therefore on to the southward, and passing to the eastward of these shoals, a reef of seven rocks will be perceived; here there is an opening leading to the harbour of Santa Cruz. Steer in west, keeping the lead going, and anchor in 8, 9, and 10 fathoms. When vessels are fairly within the reefs, the water will be quite smooth, and they will ride in a spacious and secure bay. The Rio Santa Cruz is not fit for vessels drawing above 12 feet water; but adjoining the harbour is the old and decayed port and town of Coroa Vermeil, which is, or was, capable of admitting ships of any burthen. Southward of Rio Grande is a new-built and thriving settlement, known as Belmonte; over the bar are only 2 fathoms water, and its banks are at present but thinly inhabited; but within the bar the water is deep, and it is said to be navigable to a considerable extent up the country. This part of the country is covered with immense and valuable forests.”

Baron Roussin says of the coast south of Os Ilheos,—“The coast from Os Ilheos, so far as Belmonte, or a total distance of about 21 leagues, has a direction

of S. 5° E. (*true*), and is straight, steep, and uniformly wooded. It may be approached pretty closely, as from 1 to 5 miles off the depth is 7 to 20 fathoms, on a bottom for the most part of mud and broken coral. At about 10 leagues northward of Belmonte are the Sierras de Itaraca, a group of mountains terminating the low land which runs to mount Pascoal. The southernmost of this group are the Morros de Commandatuba, from which proceeds the rivulet of the same name. From the parallel of these mountains the coast to the northward is interspersed with little hills covered with wood, and with well-cultivated valleys, forming an agreeable and variegated appearance, which continues almost so far as Bahia.

The town of Belmonte is situated upon the southern part of the entrance to the Rio Grande, which river may be distinguished by the sea breaking more violently than upon the shore to the north and south of the entrance. The river is said to be of the second order in the interior of the country, and to have over its bar no more than 2 fathoms at high water.

Between Os Ilheos and Belmonte are the little villages of Una, Commandatuba, and Boaventura. These are places of but little consequence, and are only resorted to by the small coasting vessels of the country.

Between the Rio Grande and Porto Seguro, a distance of about 37 miles, the coast runs in the direction of S. 14° W. and is covered with trees; it also gradually increases in height as vessels proceed southward. The shore, to the distance of 3 miles outward, is bordered with sand-banks, which are often perceptible at low water; vessels ought not, therefore, to venture near it without a pilot. These banks are separated by channels before San Antonio, Coroa Vermelha, and Santa Cruz, which are establishments upon the coast, accessible only to coasters, and of no consequence to large vessels."

**PORTO SEGURO**, in lat. 16° 27' S., is a place of little importance, although the town is the capital of the province. The harbour is formed by a reef, or ledge of rocks, which extends from the shore in a direction parallel to the coast, and thus forms a natural mole. The rocks are dry at low water, and the reef terminates abruptly, but appears again faintly at the distance of about half a mile; the intermediate space is the entrance or bar of the harbour, over which there is a depth of perhaps 20 feet with high tides, but the depth within shoals to 12 or 10 feet. The last may be considered as the average depth of the port. The bottom is of fine sand, gradually ascending to a broad beach.

A small river falls into port Seguro. When the port was visited by Baron Roussin, he was informed that there were 18 feet on the bar at high tide, and only 11 feet within (?), so that it is only accessible to vessels of a moderate size, and these must be very carefully navigated. He was also told that many shoals extend out to seaward, and that vessels, whose masters were not well acquainted with the coast, ought not to approach nearer than 2 leagues, or into a depth of less than 10 fathoms.

When approaching the port the church of Nossa Senhora da Judea, 2 miles to the southward of it, will be distinctly observed. This building is surrounded with trees, and is rendered remarkable by its white walls. From the town all sorts of provisions may be obtained, as the adjacent country is extremely fertile, and furnishes supplies in abundance.

The town is on the northern banks of the river, and contains many large buildings. The shore in the vicinity is steep, and the approach to the town is by a winding road, the red colour of which makes it conspicuous for many miles to seaward. Along the shore and at the port there is a large village, the inhabitants

of which are principally occupied in preparing the fish which they catch about the Abrolhos islets.

On the parallel of Porto Seguro there is an extensive bank of coral with regular soundings varying from 26 to 23 fathoms; in lat.  $16^{\circ}$  S. this bank extends to the eastward 20 leagues from the coast; its outer extremity is the Royal Charlotte bank, which is very steep, for from a cast of 23 fathoms, the lead at the next cast gives no bottom at 160 fathoms. This bank will be a good guide for approaching the Abrolhos bank if no recent observations for position have been possible.

At about 6 miles southward of port Seguro is the little shallow bay, named Trancosco; and beyond this, in following the coast to the southward, are successively the inlets named Rio de Frade, Rio Joacema, and Rio Cramimuan, all of which are barred, and are not visible more than 4 miles off.

In approaching port Seguro from southward, the cliffs become more red, and rise higher; the woods also, with which they are crowned, are mixed with cocoa-trees, a species of tree which are not found in so much abundance to the southward.

**Mount Pascoal.**—In proceeding southward from port Seguro the coast becomes mountainous, and among the hills in the interior is mount Pascoal, or Parcal, which is sufficiently lofty to be a very valuable landmark. It is situated 15 or 16 miles from the shore, in lat.  $16^{\circ} 54' 8''$  and longitude about  $39^{\circ} 25' 32''$  W., and is the first object seen when making the land from the southward on coming in from the Abrolhos. It forms part of a cluster of mountains running in a S.E. and N.W. direction, of which the most southern appears at its northern extremity in the form of a large square tower, so that it is not easily mistaken for another mountain.

When viewed from eastward, mount Pascoal presents a conical form, and is easily distinguished by its elevation, and by the adjacent heights, which are visible far off at sea.

When mount Pascoal is distant 11 leagues, either northward or southward, and the vessel is 10 to 4 miles off the land, the ground will be found to be irregular, and strewed with rocks and sand-banks, some of which are uncovered at low water. These dangers are named *Les Itacolomis*; they extend from E.S.E. nearly to the parallel of mount Pascoal. Vessels may navigate and anchor between them and the shore, on good holding ground, for a short distance, approaching from southward; but their northern parts appears to be connected to the shore by a narrow bank, which does not apparently admit of a passage over it. By keeping at the distance of 13 miles from the coast, vessels will be outside of every danger, and be in a depth of from 11 to 20 fathoms water; while at 12 miles more to the eastward there is no bottom at 70 fathoms.

Northward of the latitude of mount Pascoal, vessels may approach closer to the shore, and coast along it for some miles at the distance of 3 miles, in a depth of from 11 to 24 fathoms.

In running along the land in this part of Brazil, the coast northward from before mount Pascoal, and even from the town of Prado in lat.  $17^{\circ} 20'$ , runs N.N.E., and is low, woody, and uniform, as it is also to the southward; but it is distinguished from the latter by steep cliffs, formed of a stone of a reddish-yellow colour. The hills also in the interior of the country are few, and not so elevated as mount Pascoal or so near the sea.

At about 24 miles S.S.W. from Porto Seguro is the Rio Cramimuan, and about

15 miles further southward, and almost abreast the southern part of Itacolomi, are the little hamlet and river Columbiana. In latitude  $17^{\circ} 22'$  S. is the village of Prado, at the entrance of the little river Jucurusu, which makes an opening very visible between the trees with which the shores are covered. Vessels may approach this river to the distance of 5 miles, and they will find from 10 to 14 fathoms water on a bottom of sand and mud, which depth continues from Columbiana all the way along to Prado.

Of the coast southward from the latitude of  $15^{\circ} 30'$  it may be described generally as bordered by a number of scattered reefs, which render a close approach rather to be avoided. Along it there are many small streams, and it is said the country is peopled with such numbers of hostile Indians, that travelling along the beach is dangerous, and should not be attempted.

**Caravellas** is a small port situated in about lat.  $17^{\circ} 42'$ , and is the principal mart for farina on this coast, being the place from which Rio Janeiro, Bahia, and Pernambuco are chiefly supplied. A considerable number of smacks, barks, and launches belong to this port; these are built here, not only for its own use, but also for that of Porto Seguro. Extensive sand-banks front the entrance, through which there are two channels to the river; the bars are dangerous, and the port will only admit vessels of 12 feet; but it is said that within the bar there is a depth of 5 to 6 fathoms. It may be navigated as far as the town of Caravellas, a distance of 6 miles from its entrance; its banks are beautifully interspersed with plantations. The town is bustling and populous; the buildings are somewhat superior to those of Porto Seguro, though in the same style; but the church has a miserable appearance. The country around is well cultivated with plantations of mandioc, from which farina is extracted. (1820.)

At about 15 miles southward of Caravellas is the Rio Vicoza on the northern side of which is Villa Vicosa, and 7 miles beyond that is the Rio Mucury, at the entrance of which is the small town of Portalegre. The Rio Parapu, or San Matheo, in lat.  $18^{\circ} 37'$ , forms the boundary of the province of Seguro, and is consequently a river of some importance. It is said that these rivers all communicate with each other in the interior of the country, and that they are in general too shallow to admit anything but the smallest vessels.

**ABROLHOS.**—The Abrolhos islets and shoals are extremely dangerous, and ought to be approached only with the greatest care and watchfulness;—some of the shoal patches are distant 30 to 40 miles from the coast. Outside the group a bank extends some miles, as shown on the charts; it will be prudent, therefore, to make a frequent use of the lead when making the land. The banks are supposed to extend from lat.  $17^{\circ} 20'$  or  $30'$  S. to lat.  $18^{\circ} 15'$  S., or a distance of 18 or 20 leagues, and their breadth in longitude is probably not less. Baron Roussin says,—“These banks, the island and shoals which accompany them, probably extend to a depth of about 20 fathoms; we ought, therefore, to allow to the whole a breadth of at least 20 leagues from East to West; and I think that a large vessel should never run to the westward of the meridian of  $37^{\circ} 40'$  W. whilst between the parallels of latitude of  $17^{\circ} 20'$  and  $18^{\circ} 15'$  S.

In mentioning the meridian of  $37^{\circ} 40'$  W. as the eastern limits of the dangers in the vicinity of the Abrolhos, I do not mean that I consider that to be the precise boundary of all the paracels or shoals which surround the islands. On the contrary, the bank of soundings extends 12 miles more to the eastward; and in following a north and south course on the meridian of  $37^{\circ} 28'$  W. between the

parallels of  $17^{\circ} 40'$  and  $18^{\circ} 10'$ , soundings will there be found, varying from 120 to 27 fathoms, rocky ground, indicating, at least very probably, a still less depth. Still we did not find any bottom a few miles further to the eastward with the common lead: and it appeared certain to us, that in the meridian of  $35^{\circ} 40' W.$  no trace of the Abrolhos banks will be found."

The **Abrolhos Islets** are four in number, exclusive of several patches of rock, of which the largest lies  $1\frac{1}{4}$  cables northward of Santa Barbara islet, the largest and easternmost of the Abrolhos islets. The position of these islets seems to have been pretty well ascertained, as Captain Fitzroy's determination of the longitude of the eastern summit of the largest island in 1832, differs only  $31'$  from that previously made by Baron Roussin, Captain Fitzroy's observations for longitude giving  $38^{\circ} 41' 30''$ , while the Baron's gave  $38^{\circ} 42' 1'' W.$  The latitude of the same point was ascertained by Captain Fitzroy to be  $17^{\circ} 57' 42'' S.$

The islets, in their position with regard to each other, have the form of a trapezium, and occupy an extent of about  $1\frac{1}{4}$  miles. They cannot be seen from the mast of a frigate, in clear weather, at a distance of more than 22 miles, as they are not very high. The two most northerly are the most elevated, the summit of the westernmost being 130 feet above the sea, while the other is 115 feet. The substance of which they are composed is a soft and whitish-coloured rock, which the air continually decomposes, but which hardens in the sea. This rocky substance is of the same nature as that which constitutes the islands Castello, Figo, the Alcatraz, the reef of Manoel Luiz, and almost all the other rocks and islands near the coast of Brazil. The islands possess therefore but little vegetation except a few rushes, some cacti, wild purslain, and upon a rock nearly between wind and water, a cluster of little shrubs, the existence of which in the middle of this mass of rocks is somewhat singular.

**Light.**—On the highest point of Santa Barbara islet is a circular iron tower, which exhibits a light *flashing* once every minute. The light is elevated 189 feet above the sea, visible 17 miles. Position, lat.  $17^{\circ} 57' 42'' S.$ , long.  $38^{\circ} 41' 30'' W.$  *Too much dependence must not be placed in this light.*

Innumerable sea-fowl resort to the islands, and cover them with their eggs and nests; but none of these birds are fit to eat. Turtle occasionally is found, but in less numbers than the solitude of the situation would lead one to suppose. Marine salt, perfectly crystallized, appears in many places; and a few drops of soft water occasionally filtrate from the lower part of the rocks, at the northern point of the most northerly island of the group. Many vessels from Porto Seguro are employed every year during the northerly monsoon at this station; they get cargoes of fish of a very good quality, which they call *garoupas*; these when dried, form the principal food of the inhabitants and their slaves. The vessels generally remain out about six weeks.

Immediately to the eastward of the Abrolhos islets is the extensive rocky bank, known as the Parcel das Abrolhos; it is steep-to, is about 20 miles in extent north and south, and 3 to 4 miles wide. The passage between this bank and the islets is obstructed by shoals, one of which has only  $2\frac{1}{4}$  fathoms water on it.

**Abrolhos Channel.**—There is a channel inside the Abrolhos islets, which is sufficiently wide to admit the passage of large ships, its depth ranging from 9 to 15 fathoms. It is considered prudent to avoid attempting this channel unless compelled by circumstances. It is bounded on the west side by the extensive banks and reefs named the Paredes, which are in general steep-to, and have many rocks upon them even with and above the surface of the water. These reefs are

rendered the more dangerous by the very little warning of their vicinity that is given by the soundings, and their steepness of edge has gained for them the Portuguese term *Paredes*, or the *Walls*. It is said that, notwithstanding the shelter afforded by the islands within which they are situated, the sea breaks, in bad weather, over many parts of these shoal grounds.

The *Parcel das Paredes* is an extensive cluster of rocks and shoals extending about 15 miles in a north and south direction and from 6 to 10 miles in breadth. Off its northern extremity several detached reefs extend in a N.W. by N. direction, the furthest one, named Arca, being distant about 6 miles. Still further northward is a group of rocks, known as the Timbebas reef; its centre lies in lat.  $17^{\circ} 27' S.$ , long.  $80^{\circ} 1' W.$ , and its extent is about 4 miles N.W. and S.E. and 1 to 2 miles across.

Fronting the entrance of the river Vicosa and distant  $6\frac{1}{2}$  miles in a southeasterly direction are two clusters of reefs known respectively as the Vicosa reef and the Coroa Vermelha; at 4 miles E.N.E. from the latter reef is another, named Sebastio Gomez reef. Outside these reefs and distant about 20 miles from the coast is a shoal, the least water upon which is  $2\frac{1}{2}$  fathoms; its position is lat.  $18^{\circ} 1' S.$ , long.  $38^{\circ} 58' W.$

From the eastern edge of the Paredes, as well as from the middle of the Abrolhos channel, the low flat coast of Brazil may be plainly distinguished in clear weather, and will be noticed as well wooded, its flatness giving it the appearance of being overflowed; from this position the Abrolhos islets will also be seen.

The narrow channel between the Paredes and the coast, which has from  $4\frac{1}{2}$  to 7 fathoms water, is intricate and dangerous, and should not be attempted without the assistance of one of the local pilots.

Baron Roussin observes,—“ We have not an exact knowledge of the Paredes, particularly of their interior, or of the coast within them, and which can only be explored minutely in very small vessels. The information we collected respecting the channel separating the Paredes from the adjacent shore, proved that it was only navigable by coasting vessels conducted by the natives of the country: and that the heads of the shoals sometimes rose above the surface of the water, rendering it impossible to attempt a passage without the assistance of an experienced pilot.

From the same authorities we were given to understand that the banks of the Paredes extend from a little to the north of the village of Alcobaca, or from the parallel of  $17^{\circ} 29' S.$  to  $18^{\circ} 6' S.$ , which is near the bar of Portalegre.”

The Abrolhos channel is nearly 3 leagues wide, and has a depth in general of 14 to 9 fathoms; there are, however, a few spots of 7 fathoms, and perhaps less water might be found if a close examination of the channel were made. The direction in which the most water is found is nearly S.S.E. and N.N.W., in passing at about 2 miles westward of the islets. Large vessels may anchor on this side of the islets, giving them a berth of from one to 8 miles.

Baron Roussin seems to have thought the Abrolhos channel unsuitable for large vessels, and certainly its full advantages have yet to be ascertained. In October, 1834, a naval officer, writing from Rio Janeiro, remarked that they sailed round the Abrolhos islets, and found the inside channel perfectly safe, and that he should think any vessel might sail inside them without risk, if it had the advantage of daylight and favourable weather. It has also been observed that H.M.S. *Doris* by adopting the inner channel, in 1823, made the passage to Bahia from Rio Janeiro in half the time the *Conway* did, by keeping well outside. The

*Doris* sailed from Rio after the *Conway*, and arrived before her. The *Doris* had smooth water and favourable weather, while the *Conway* had a troublesome sea, and much wind.

Mr. Wood, R.N., remarked in 1823,—“The Abrolhos are low, and their vicinity should be approached with caution; but, with due attention to the lead, they may be passed with safety; and should a vessel be so situated, while attempting to pass them, either from the southward or northward, as not to be able to weather them without tacking, they will find a safe channel to the westward of them and of some rocks just appearing above water.”

Captain Fitzroy said in 1832,—“Having made both passages, I venture to observe that going within the Abrolhos certainly shortens that between Rio and Bahia very much; but yet I would not recommend it to any vessel unless she has reason to make unusual haste. The soundings are very irregular, varying suddenly from 20 to 6 fathoms; and there are both reefs and currents.”

On the bank of soundings upon which the Abrolhos are based, the depth in general vary abruptly; and frequently, in small spaces, deepen from several feet to as many fathoms. These undulations appear nearly in a North and South direction.

An oozy or muddy bottom is rarely found on the ground of the Abrolhos; the presence of ooze in the soundings being a certain indication that you are without the shoals. Baron Roussin, in 1819, found no part without a large mixture of sand and broken madrepore or bits of coral, and in the interior of the channel only; and he adds that the quality of bottom, most common around the Abrolhos, is a whitish sandstone, composed of the *débris* of madrepore, and of a greater or lesser consistency; sometimes this stone is very firm, and combined with sand and rock, mostly to the N.E. of the islets. Nearer to these, from S.S.W. by west to N.E. the bottom consists of ground like white mortar, in which the anchor penetrates but little, though it holds fast.

Another navigator has observed, that “in the neighbourhood of the Abrolhos you have coral bottom, and unequal soundings; after passing them at the distance of 30 miles N. or S., you will have a bottom of light brown sand and shells. The current sets strongly over the shoals in a S.S.W. direction. About 30 miles westward of the islands we found a current setting at the rate of 20 miles a day; no doubt with heavy northerly winds they are much stronger, as the currents on this coast are much influenced by winds. When the Abrolhos islands bear S.S.W.  $\frac{1}{4}$  W., they appear like two hillocks with high table land inside of them: the soundings are from 14 and 16 fathoms, bottom of broken shells and rock resembling coral.”

Captain Fitzroy, in the narrative of the surveying voyages of the *Adventurer* and the *Beagle*, says,—“Our course was shaped to the south-east, towards the eastern limit of the great bank of soundings, which extend so far to seaward of the Abrolhos islets. Having reached the parallel of the islands, and being to the eastward of the easternmost soundings laid down in any chart, without finding any ground with 300 fathoms of line, I began to steer westward, sounding continually, and keeping a sharp look-out at the mast-head. At two in the afternoon of the 26th (March, 1832), we had no bottom, with 300 fathoms of line; and at the next cast, about an hour afterwards, found only 30 fathoms without there being the slightest change in the colour of the water, or in its temperature, or any other indication of so sudden a change in the depth. We hauled to the wind directly, worked to the eastward in order to ascertain the precise limit of the

bank, and lost soundings as suddenly as we had previously struck them. A grapple was then put overboard, with 200 fathoms of line, and we again steered westward, till a heavy pull upon the line, and a sudden jerk, showed that we had hooked the bank.

The ship was hove-to, and the necessary observations made upon the spot. The grapple, when hauled up, was found to be straightened,—a proof, in addition to that afforded by the lead, that the bottom was rocky. Our soundings at this time were 38 fathoms, and thence to the Abrolhos islets we carried a line of soundings, nowhere exceeding that depth, but extremely irregular, between 36 and 4 fathoms.

As far as we had time to examine, the chart of these islands by Baron Roussin appeared to be satisfactory; but the soundings are so irregular in the vicinity of the Abrolhos, that little dependence could be placed on the lead. More than once we had 4 or 5 fathoms under one side of the vessel, and from 15 to 20 under the other. These sudden and startling changes, called by the French, "*Sauts de Sonde*," are very unpleasant and perplexing.

The tide, or rather current, which we found when lying at anchor near the islets, sets continually to the southward, varying in strength from  $\frac{1}{2}$  to  $1\frac{1}{2}$  miles an hour; but we had only three days' experience.

I had imagined, from what I had heard, that the rock of which these islets were chiefly composed was coral; but was surprised to find only coralline growing upon gneiss or sandstone.

By those employed in the coasting trade, the Abrolhos are said to be particularly subject to squalls. If this be true, what is the reason? Have the extensive shallows in their vicinity any connexion with the fact? I think they have."

*Tides.*—The tides in the vicinity of the Abrolhos are irregular. The currents follow the direction of the prevailing wind, and their velocity at the time of Baron Roussin's visit did not apparently exceed  $1\frac{1}{2}$  miles an hour. The winds were then light and easterly, which favoured the soundings, and made it easy to take good observations.

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## THE ABROLHOS TO CAPE FRIO.

**Rio Sao Mateo.**—In following the coast to the southward from the Abrolhos banks, the first river met with is the Sao Mateo, in lat.  $18^{\circ} 37' 10''$ . It is a small stream of but little importance, there being only  $4\frac{1}{2}$  feet on the bar at ordinary high tides, and 9 feet at full and change, so that there is access only to very small vessels; and the breakers, which constantly appear at the mouth, render the navigation dangerous, even to canoes. The people of the country get over this passage in a sort of punt, drawing very little water, or on the rafts known as *jangulas*.

The entrance to the river is small, with breakers on either side, within which may be seen, among the trees, the masts of boats. It is said that in fine weather there may be seen at some distance inland, and at a little to the south of the bar, three small downs, of which the middle one is the highest, and which serve as a mark from eastward. These downs appear alongside each other, when viewed from North or South, but when seen from eastward appear in one; this appear-

ance must not, however, be depended upon, as it varies very much according to the state of the atmosphere: the most certain way to make the bar will, consequently, be to be sure of your observations for latitude.

It may be remarked in general, that the communications between the sea and the interior of Brazil, by the rivers, are very difficult, and particularly so as respects the Rio Sao Mateo and other rivers which resemble it. The pilots say that the Sao Mateo turns to the northward above the entrance, after which it has many sinuosities. The little town bearing its name is at 7 leagues from the entrance.

From the Rio Sao Mateo southward to the bay of Espirito Santo the distance is about 105 miles, and the coast is only broken by the outlets of the rivers Seca, Doce, Dos Reis Magos, and Carahype, which are all streams of little consequence. In sailing along, there is no danger to be apprehended till abreast the entrance of the river Doce, in lat.  $19^{\circ} 38'$ , off which shoals extend about 4 miles; off point Tubarao, the northern point of the entrance to Espirito Santo there is also a reef of rocks. With these exceptions vessels may approach the coast to a moderate distance, there being at 2 or 3 miles off a depth of 9 to 20 fathoms on a bottom of sand mixed with gravel, mud, coral, and broken shells.

From the Rio Sao Mateo the general direction of the coast-line to the Rio Doce, is nearly north and south; and from the Rio Doce towards point Tubarao about  $S. 32^{\circ} W.$  (*true*). The land is generally low, and covered with trees, and the shore appears red, from the colour of the sand; but in the interior, between the Sao Mateo and Espirito Santo, the country becomes more elevated. In approaching Espirito Santo, the land runs high close to the shore, and it is only to the northward of the Rio Doce that the country, viewed from the sea, appears entirely flat; it does not change this appearance until, in going northward, mount Pascoal is reached, a distance of more than 50 leagues.

It is not more difficult to recognise Espirito Santo when coming from northward than from southward; for the mountain of Maestre Alvaro, which succeeds the low land in the former case, or nearly terminates the high land in the latter, leaves no doubt as to the position of the vessel.

The first river south of the Sao Mateo is the Rio Seca, in lat.  $19^{\circ} 10'$ , the entrance to which appears only as a little opening between the trees on the land. It is very probable that this river exists only in rainy weather, and this supposition seems confirmed by the only information obtained concerning it.

As I had no one on board acquainted with the coast when I surveyed this part of Brazil, I cannot answer says Baron Roussin, for the correctness of the names of the places which we have given, from the Rio Sao Mateo so far as Espirito Santo. In this we have been guided by the charts apparently the least erroneous, so that we can only speak to the configuration of the coast, and its geographical position.

**Rio Doce.**—At 10 leagues southward of the Rio Seca is the entrance to the Rio Doce, which is said to be a river of some size, extending far into the country, but having an entrance too small and shallow to admit large vessels. Its outlet appears to be of considerable dimensions between the trees with which the shores are covered; a bank of red sand runs out from each of the two points, and the passage is also obstructed by a shoal partly above water. The northern point runs out a little more than the other, and a large building stands upon it.

Pimentel says of this river,—"Its waters are so rapid and full, that the entrance becomes difficult even to small craft, though the depth is considerable, and canoes

can navigate it upwards of 20 leagues. It is said to take its rise from some mountains near Villa Rica, and runs first in a northerly, and then in an easterly direction, for a distance of 500 miles, through a rich and fertile, but neglected country. It might be made to contribute largely to commerce, were the inhabitants addicted to industrious pursuits."

The coast between the Abrolhos and Espirito Santo has also been described in the following manner by Mr Bruce, Master of H.M.S. *Diamond*, in 1826. It will be observed that his description begins with Espirito Santo, and that he is running along the coast from south to north:—

"Tubarao or Shark's point, is a low but well-defined point, on which stands a long white house, with several well-arranged negro huts, having around them a plantation; these appear at a distance not unlike a fort and barracks. Inland of the point there is a range of mountains stretching to the W.N.W. and S.W. Off the point runs a reef full a mile long, having from 10 to 16 fathoms at a short distance from it, with a coral bottom. The coast from Shark's point to Aguaripe, or Carahype, is low and sandy, covered with cocoa-nut trees; and the soundings gradually decrease to 3 fathoms a short distance from the shore. In some charts there are the island of Reposo, and the Three Brothers; also the island of Goereé, off the entrance off St. Matthias (Mateo), but I believe there are no such islands in existence: there are indeed three rocks lying a few fathoms from the beach, in about latitude  $19^{\circ} 57'$ ; and the water breaks over a number of stakes which are placed at the entrance of the River Magos. Several islands are also placed at and about the entrances of the Parupa, or Pernipe, and Caravellas rivers, which do not exist; for I went in and sounded there, finding gradual soundings up to the bar, which is connected with the main, and on which are not more than 7 or 8 feet at low water; it then deepens to 2 fathoms, and the channel lies north-easterly, being from a quarter to half a mile in breadth; but off the mouth of the river, which forms like a basin, there are 14, 13, and 12 fathoms; thence it abruptly shoals to 12 feet in the channel, as you approach the village of Viconi (Vicoza); this stands on the left bank of the river, about 2 miles up, and is the only place of any consequence hereabout. The commerce here is for farina. I passed between the island Caravellas and the shore, at not more than 3 miles' distance, and saw no other island.

The island Caravellas is low, and has a few trees upon it; it is about 2 miles in circumference, and lies in a N. and S. direction, being surrounded with coral reefs. Its western and northern sides are the boldest, and may be approached to within a mile. Working through between it and the main, the channel was about  $1\frac{1}{4}$  miles broad, and had  $4\frac{1}{2}$  fathoms within it sand and coral, gradually deepening to 9 fathoms, until getting abreast of a low sand-bank, which has an anchor upon it, and bears from the island N.E. by E., distant  $4\frac{1}{2}$  miles. Here I stood in between them, and anchored for the night, with the island bearing S.W. by S., distant 2 miles, and the sand-bank E.  $\frac{1}{2}$  N., distant  $1\frac{1}{4}$  miles, in 8 fathoms, stiff mud.

Vessels may round the western part of the bank in 6 fathoms, at the distance of a quarter of a mile from it, when the water will deepen to 9, 10, and 11 fathoms; thence it will become very irregular, from 11 to 5 and 4 fathoms. Here the coral reefs will be visible close to the water's edge, and vessels may pick their way between them, having a boat sounding ahead, and the ship under easy sail, with a look-out from the mast head; frequently the line will be in 9, 8, and 7 fathoms, while the upper part of the line will touch the edge of the branches of coral;

but as the water is generally smooth, and the reefs for the most part are visible, the dangerous spots may easily be avoided. In many parts the water becomes discoloured, and will have only 10 or 12 feet over them; these should be carefully avoided. On the northernmost reef we saw the wreck of a vessel, in latitude  $17^{\circ} 42'$ , and longitude  $39^{\circ} 9' W$ . From the anchorage under the reef where the wreck lay, we steered out S.E. by E., passing over uneven ground, and having 11, 6,  $4\frac{1}{2}$ , and 12 fathoms for the distance of 12 miles; it then deepened to 13, 14, and 17 fathoms; but as we approached the Abrolhos, it became more regular. We came to in 12 fathoms, sand and broken coral, having the south-eastern Abrolhos N.E. distant 3 or 4 miles. We landed on three of these islets, and could not discover either wood or water upon them, excepting two low stunted trees which grew upon the point of one of them. Birds and birds' eggs are abundant, and coral rocks surround them. When standing to the north-westward from the above anchorage, the bottom was rugged and uneven; when stretching to the eastward, the water deepened for 3 or 4 miles, and then abruptly shoaled from 17 to 10 and 9 fathoms. E. by S., distant 4 miles, there was a dangerous reef of rock and coral, even with the surface of the sea, but with 10 and 17 fathoms alongside of it; from our anchorage to this rock the group was uneven, 17, 13, 6, 5, and 8 fathoms. To the north-eastward the ground continued irregular, but the water became deeper. N. by E.  $\frac{1}{2}$  E. from the Abrolhos, distant 5 leagues, we had 14 fathoms."

**ESPIRITO SANTO.**—This bay is about 3 miles in extent, and has a depth at its entrance of about 9 fathoms, which decreases considerably as the river is approached. Its situation may be readily ascertained by the Pacotes rocks, and further south by the islands and rocks of Jicu, which all lie a little south of the entrance; but the best marks when at a distance are the mountains, Moreno and Mæstre Alvaro, of which the former is on the south point of the bay, and the latter on its northern side, a few miles up the country.

Mount Moreno is conical and partly wooded, but devoid of verdure on the eastern side; it is also so high that it may be seen, in clear weather, at 10 leagues off. Its base forms, on the North, the south side of the entrance to the river of Espirito Santo. At  $2\frac{1}{2}$  miles to the S.E. of it are the two rocks named the Pacotes, which are of unequal size, and have a passage between them and the

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\* The province of Espirito Santo, of which this is the capital, embraces the old captaincy of the same name, and part of that of Porto Seguro. It is bounded by Rio de Janeiro on the south, Minas Geraes on the west, and Bahia on the north. Although this portion of the coast was that discovered by Cabral, and settled by the first Donataries, yet it is still but thinly inhabited, and has not made the advances that may be found in most other parts. Its soil is fertile, and specially adapted to the cultivation of sugar-cane, together with most of the intertropical productions. Its forests furnish precious woods and useful drugs, and its waters abound with valuable fish. Yet vast regions of its territory are only roamed by savage tribes, who still make occasional plundering incursions upon the settlements. Surveys have recently been instituted upon the Rio Doce, from which it is thought practicable to render that stream navigable to small steamers. An organized company has the enterprise in charge, and proposes to open a new and direct means of transport between the coast and the province of Minas Geraes. Should this undertaking succeed, it will be of great importance, not only to the province of Espirito Santo and Minas Geraes, but also to the city of Bahia, to which large quantities of the produce exported would be directly conveyed.

shore fit only for very small vessels. And at about a mile S. 60° W. from mount Moreno, is the Morro of Nossa Senhora da Penha, a rocky hill, on the summit of which is a handsome church of the same name, visible at a distance of five leagues.

Mount Maestre Alvaro, or as it is pronounced by the pilots *Mestialve*, is very lofty and readily distinguished by its form and insulated position, which is rendered more apparent by the land in its immediate vicinity being rather low. This mountain succeeds the low lands of the North, and nearly terminates the high lands of the South, so that when in sight it ought not to leave a mariner in doubt as to the position of his vessel, even when the latitude is uncertain, or from circumstances, cannot be obtained.

In the bay there are two large islands, which occupy a considerable portion of its surface. The passage in is southward of these islands, between them and mount Moreno; it is about one-third of a mile wide, and is much obstructed by reefs. A dangerous rocky shoal, with deep water close to, lies in mid-channel, at the entrance of the river; its centre bears E.N.E. distant  $1\frac{1}{2}$  miles from the peak of mount Moreno; nearer the shore of the south point of entrance are the rocks named *La Balea* and *Le Cavallo*, all which must be carefully avoided. The least depth of water on the bar, which lies to the southward of Ile do Boi, is 13 feet (1863); further in the depth increases to 4 and 5 fathoms. Here vessels may anchor with the town of Espirito Santo in sight, distant about half a mile.

At Victoria, the capital of the province, 3 miles within the entrance and on the northern side of the river, it is probable vessels may obtain all necessary supplies, as it is a considerable town, containing 3000 or 4000 inhabitants. Water may be obtained at about a league above the town, and even in the town it may be had in moderate abundance. At a mile eastward of the meridian of the town there is an enormous conical rock, named Pao de Acucar or the Sugar-loaf, for which vessels steer on entering the river so soon as they have doubled mount Moreno.

The climate is considered to be not very healthy, as it is extremely damp. The lofty mountains on this part of the coast, the peculiar nature of the soil surrounding the city, together with the deep cut of the river, on the banks of which the town is built, is thought sufficient to account for this.

*Light*:—A fixed white light is exhibited from a tower on Santa Luzia hill, on the south side of entrance of Espirito Santo bay; it is elevated 66 feet above high water and visible 12 miles.

*Tides*:—It is high water here on the days of full and change of the moon at 8h.; and the rise and fall of the tide is 4 feet. The tides are only regular within the entrance. Strangers should not attempt to run into the bay without a pilot's assistance.

Mr. Bruce, of H.M.S. *Diamond*, said of this bay. in 1826,—“It may readily be known by mount Moreno, and the convent of Nossa Senhora da Penha, the latter being a very conspicuous handsome white building, on the summit of the next hill southward of mount Moreno. In sailing into the harbour, keep over towards mount Moreno, and when within half a mile of it, some rocks above water will be observed, over which the sea breaks continually: give these a berth of a full quarter of a mile, leaving them on the port hand; and so soon as the whole of the convent comes open westward of mount Moreno, bear up and steer for it; then anchor in  $5\frac{1}{2}$  fathoms, fine sandy ground. You will now be

inside of the two points of the harbour; *Shark's Point* will bear N.N.E.  $\frac{1}{2}$  E., the port point of the river S. by W., and the convent S.W. by S. With these bearings a vessel will be about 4 cables outside of the bar, upon which are not more than 3 fathoms water. There is also said to be good anchorage outside of the river, in the bay under mount Moreno, in 7 fathoms, by steering in as above directed, and bringing up the instant a remarkable high tower or steeple, which is in the town of Victoria, opens of point Moreno; but neither bay nor river will afford good shelter for a ship that draws more than 16 feet water, with easterly winds; for then in the finest weather, a ground swell tumbles in, so that a vessel drawing 18 feet, although she may come in to  $4\frac{1}{2}$  fathoms, will surely strike the ground with the least fall of the water. The bar stretches across the river, about a quarter of a mile below the low battery on the beach, directly under the Convent Nossa Senhora da Penha. Above the bar vessels will have 7 fathoms water.

The harbour and entrance of this river cannot be discovered until abreast it; and from the manner it is commonly laid down on the charts, we did not know where to look for it. The town of Victoria lies about  $3\frac{1}{2}$  miles up the river: it was once a neat and respectable place, but now there are only two or three good buildings in it, and it appears to be fast sinking into ruin."

**Guarapari Islets, &c.**—These islets are about 13 miles southward of the Jicu islets, and in about lat.  $20^{\circ} 38'$  S. It is thought that between them and the shore there may be a passage, but it is uncertain. Close to their eastern side there is a depth of 7 fathoms. Between Espirito Santo and the islets the depth at 2 to 7 miles from the shore varies from 10 to 20 fathoms.

The Raza islets lie about 4 miles southward of the Guarapari islets, and are low. Further southward is a small islet named Escalvada, having between it and the Razas a channel, in which the depth is 14 to 11 fathoms.

**Rio Guarapari.**—The Guarapari river is in lat.  $20^{\circ} 42'$  S., immediately to the westward of the Raza and Escalvada islets. It discharges itself into a small bay; and the name, Guarapari, as is frequently the case in Brazil, is applied universally to the bay, river, and town. The entrance of the river may be recognised by a fort (in ruins) on its southern point, a quarter of a mile southward of which is a remarkable palm tree on a hill close to a church. On the bar of the river the depth is 9 to 10 feet; when within the entrance the town will be observed on the southern side. The river, which is not more than  $1\frac{1}{2}$  cables in width, stretches to the southward parallel to the sea-shore, and the town is situated on the neck of land between the river and the sea. The anchorage, in 9 to 10 fathoms, in the bay is considered unfavourable, there being a strong swell of the sea, which continually sets in upon the coast.

The town of Guarapari is the most important town between Espirito Santo and Rio Janeiro, and till lately was famous for its patronage of the slave trade. No part of it is visible from the bay, and even on approaching the mouth of the river only a few huts appear.

According to Baron Roussin, the Rio Guarapari enters the sea between two woody hills, of which that on the south side is distinguished by a few palm trees, (visible to seaward), many houses, and a church with a steeple. The other hill is named Serra Pero Cao, and it appeared to him that in entering the river, the highest mountain, named mount Guarapari, should be kept in sight to the N.W.

The port should be run for by strangers only with the assistance of a pilot. Pimentel considered the river too shallow for any but the smallest vessels, and

remarked that these should steer in West, or anchor between the islands and the main.

The coast hereabout, and to the northward, is of moderate height, almost covered with small trees, close to each other, and having at certain distances, low yellowish cliffs, which are not found to the southward of Benevente point, in lat.  $20^{\circ} 51'$ . In the interior of the country are several groups of remarkable mountains, upright, conical, and inclined, which give to this part of the coast a character different from that which precedes it to the north, and follows it to the south.

Of the coast south of Benevente, as far as the Santa Anna islands, it may be described as generally very low, and appearing, when at a distance, partially submerged, only clusters of trees and small patches of soil being visible. It should therefore be cautiously approached. Inland, and distant from the shore, in some parts as much as 13 leagues, there is a chain of mountains, which may be seen in clear weather a considerable distance off.

**BENEVENTE BAY.**—This bay is in lat.  $20^{\circ} 50'$  S. In approaching it from northward, the soundings at 5 miles S.W. by S. from Escalvada islet are irregular, and there is frequent occasion to haul out in order to preserve a depth of 12 fathoms. Such soundings are said to extend out about 4 miles to the S.S.W., and the water about them is represented as discoloured. The least water obtained was  $6\frac{1}{2}$  fathoms; and as the depth shoals very suddenly from 12 to 8 and 6 fathoms, it is probable that if there are any dangers they will show themselves plainly by the rippling of the tide, or strong breaking of the sea.

Benevente point is of moderate height, and has a reef extending from it in a S.W. direction about a mile, upon which, at low tide, the greatest depth is not more than 6 feet. Off the extremity of this reef there are two patches of rocks, named Baixo Grande and the Cormorant rock, of which the former has only 5 feet upon it at low water, and the latter  $2\frac{1}{2}$  fathoms. These rocky patches are distant from the extremity of the point about 2 miles, and are extremely dangerous, the soundings around them being 6 and 7 fathoms; when running into the bay, therefore, vessels ought not to approach the point nearer than 4 miles, and even then should not get into less than 8 fathoms.

Benevente bay is wide, shallow, and exposed to the S.W., but the reefs from the point above mentioned, in some measure protect the anchorage from the heavy S.E. swell; so that although the depth at 2 miles from the shore is about 5 fathoms, on a bottom of sand and mud, it cannot be considered a very desirable anchorage for large vessels. Vessels drawing more than 10 feet cannot approach the shore nearer than a mile, but must anchor at some distance off, in  $4\frac{1}{2}$  fathoms, and then a little care is necessary to choose the ground. The marks that have been given for the anchorage are the extremity of Benevente point E.S.E., and the south point of Benevente river North.

The town of Benevente is situated on the east side of the entrance to the river, and is a place of little importance. With the exception of the church and a building attached to it, it is all built on very low ground, so little above the surface of the river, that it is not unusual for the thoroughfares to become flooded in the rainy season. Many of the houses are in a sad state of dilapidation. A few small coasting vessels are built here, and a considerable trade in farm-stock is carried on up the river. Canoes can ascend the river for about 2 miles from the town.

It is high water here on the days of full and change of the moon at 3h., and the rise of tide is about 5 feet.

**Rio Piuma.**—This is a small stream, situated about  $3\frac{1}{4}$  miles westward of Benevente river. At its entrance there are three small islets, close to the east side of which there are 3 and  $3\frac{1}{4}$  fathoms water. It is said that considerable quantities of rosewood are brought down this river, and that this article can be purchased at a moderate price.

At about 5 miles southward of Piuma river there is a small island named Française, which is distant from the shore  $1\frac{1}{4}$  miles. This islet ought not to be closely approached, because an islet and reef lie off its north-east point, and is steep-to, there being 6 to 8 fathoms close to its edge; neither ought an attempt to be made to run between it and the shore, as the depth in the passage is not more than 6 or 8 feet. A prudent ship-master, bound to or leaving Benevente bay, will therefore take care to steer such a course as may carry him well outside the islet.

**Rio Itapemirim.**—The entrance to this small river is in lat.  $20^{\circ} 57' 30''$  S., or about  $3\frac{1}{4}$  miles south-westward of Française island. On its banks there is a village to which only boats have access, there not being more than 6 to 8 feet water. The houses are generally in a ruinous-condition.

Facing the entrance to Itapemirim river there are two or three small islands, the outermost of which, distant about a mile from the shore, is named Egg island. It will be prudent to give these a wide berth, as there are dangerous reefs in their vicinity. Large vessels should not approach nearer than 6 miles as a coral patch, with  $4\frac{1}{4}$  to 5 fathoms on it and 8 to 10 fathoms close to, lies about 5 miles eastward of the river's entrance.

South of the Itapemirim river the coast is hilly for about 17 miles; thence to Itabapuna, a distance of 7 miles, it is low and woody. This part of the coast should be carefully approached as it has not been closely examined. The general depth at about 2 miles from shore is 5 to 7 fathoms, but there is a small patch of 3 fathoms water lying at about 5 miles from shore in about lat.  $21^{\circ} 11' S.$  which must be guarded against.

Mr. Wilberforce, R.N., says,—“Of this part of the coast there is good anchorage in the vicinity of the Three Red Cliffs—some cliffs forming a conspicuous break in the dun colour that stretches right and left. At the foot of these cliffs, behind a sandy beach, there is a small wood, amongst the trees of which several huts are discernible. And, off the cliffs there is a shoal of  $2\frac{1}{4}$  fathoms, of which the bearings are as follows:—large white house on the top of the cliffs, S.W. by W. 4 miles, and two remarkable hills N.W. by N.”

**Itabapuna.**—A small river of this name falls into the sea in lat.  $21^{\circ} 19' S.$ ; its entrance is narrow and obstructed by a shallow bar. Fronting the entrance of the river are numerous rocks and shoals above and under water; some of which extend a distance of 2 miles off shore. Here vessels will find anchorage in 4 to 5 fathoms either northward or southward of the shoals. The usual anchorage outside the river is with a large house bearing S.W.  $\frac{1}{4}$  S. 2 miles; the outer reef S.E. by E. 2 miles; and the point of the red cliffs N.E. by N.

**Rio Parahiba.**—At about 3 miles southward from Itabapuna is point Castellanos, off which are several shoal patches a mile off shore; at  $15\frac{1}{4}$  miles further southward is the entrance of the river Parahiba, in lat.  $21^{\circ} 37' S.$ , a barred river, which can be entered by strangers only when in charge of a pilot. There are two passages into the river, one named Barra Gargau faces northward

the other, known as Barra do Parahiba, faces eastward: at their junction, on the southern side of the river, is the village of San Joao da Barra. At about 20 miles from the entrance there is a village of some size, named Campos, or San Salvador, which appears to be rapidly rising in importance. The country around this village is known as the Campos dos Goyatakazes, or plains of the Goyatakaz Indians, the aboriginal inhabitants. It is a rich tract of country, of surpassing beauty and fertility. Campos is on the southern bank of the river, and has regular and well-paved streets, with some fine houses. Its commerce is extensive, employing a vast number of coasting smacks to export its sugar, rum, coffee, and rice. The sugars of Campos are reckoned among the finest produced in Brazil.

All this coast, to cape San Thomé, consists generally of a low sandy beach, thickly covered with brushwood, having here and there a stunted tree. The cape itself terminates in a low sandy point; the country also, to a great extent within it, is low, and intersected by many rivers and lakes.

The soundings off point Murubu are very irregular, 13 to 9 and 6 fathoms; the water thence deepens suddenly, with a hard rocky bottom. S.E. from this part of the coast, 10 or 11 leagues off, there are 20 to 22 fathoms of water, and bottom of very fine white sand; but thence toward the shore, and toward cape San Thomé, the soundings gradually become coarser and more regular.

It has been observed by Baron Roussin, as an indication that may be useful, that in the vicinity of cape San Thomé, the muddy bottom, so common to the south of this parallel, almost entirely disappears, being here succeeded by a bottom of sand and broken shells; these are, at least, the qualities of bottom found on the survey, from the coast to the distance of 10 or 12 leagues off. It may be remarked again, that at several leagues to the south of the parallel of Belmonte, or about  $16^{\circ} 20'$  S., commences a bottom of white tufa or sandstone, mixed with, or formed of, broken madrepora, which extends far to the northward, and which is scarcely, if at all, found to the southward.

**Cape San Thomé.**—Cape San Thomé (St. Thomas), in lat.  $22^{\circ} 2'$  S., is, as before noticed, of but slight elevation. It cannot be seen far out at sea, and therefore a shipmaster ought to be very cautious in approaching it. The only objects visible at a moderate distance off are some trees and little patches of land, the whole country having much the appearance of drowned land.

**Bank of San Thomé.**—The bank surrounding cape San Thomé is extremely dangerous, and the more so as it extends in an easterly direction fully 10 miles from the coast; \* it will be prudent not to approach the cape nearer than at least 12 miles.

The bank was partially examined by Mr. Napier, R.N., in 1825, who reported that it consisted of a rocky shoal of a circular form, nearly 5 leagues in diameter, and that its southern edge bore E.N.E. from cape San Thomé.

It appears probable that there is a narrow channel between the bank and the cape, as statements have been made that small vessels (those employed in the coasting trade of the country), can pass between it and the shore. The soundings on the bank are uncertain, and as little as 8 feet have been reported.

Baron Roussin says,—“The flat ground around cape San Thomé extends a

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\* Captain Fitzroy, R.N., when in the vicinity of cape San Thomé, in March, 1832, saw nothing of these breakers, although he sought anxiously for them, and steered so as to pass the places from which he was assured they could be seen.

great way under water, and forms what the natives call the banks of San Thomé. According to the coasters of the country, these banks are confined on the north and south, between the parallels of  $21^{\circ} 37'$  and  $22^{\circ} 12'$  S., or, between the Rio San Joam de Campos and the Frade de Macahé. Their extent in longitude is less known; but we have reason to think that it is not very considerable, if we may be allowed to judge by our soundings.

The depth of 12 to 40 fathoms, which we found from 5 to 30 miles off the land, and which went on gradually increasing from the coast to seaward, does not allow us to suppose there can be any shallow grounds outside of this last distance; and we are inclined to believe that at half this distance, that is to say at from 15 to 18 miles from the coast, whilst between the above-mentioned parallels, no danger would be incurred in a vessel drawing from 12 to 15 feet water.

Our tracks round cape San Thomé left a small space unexplored; this cannot be avoided, even with the greatest possible care, in navigating such a low coast, which cannot constantly be seen so as to correct the whole for the effect of the currents. It is possible, then, that in this unexplored part less depths may be found than those we obtained in our tracks; but that was not the opinion of the pilot I had with me: at all events, according to our soundings, which I can warrant, there is little chance that these shallow parts will be met with more than 3 or 4 miles to the eastward of the meridian of  $40^{\circ} 40'$  W.

Besides, this meridian being only 6 leagues from the lowest parts of the coast of Brazil, the most simple precaution directs you not to pass to the westward of this boundary, whilst you are between the parallels of  $21^{\circ} 37'$  and  $22^{\circ} 12'$  S., which space we have assigned to the banks of San Thomé. The opinion that a few parts of this bank have only 2 or 3 fathoms over them, and that they break in bad weather, has also its partisans in the country; but our pilot did not agree with them; and those who believe so, say that these shoals are but a little distance from the shore. We did not discover any breakers, and we think the largest vessels will find sufficient depth of water by keeping 6 or 7 leagues off the cape.

In order to confirm this statement, we shall add the opinion which prevails among all the coasters of Rio Janeiro who frequent this part; these say, "that on leaving the bay of Campos, or San Joam, and sailing to the S.E. 8 or 10 leagues, a vessel may steer to the southward without danger, and be certain of passing outside of all the banks." This agrees with our own experience, and our chart will show that a S.E. course from San Joam will carry vessels over a depth which can leave no doubt of their safety."\*

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\* We extract the following from the *Nautical Magazine*, 1834, as it supplies an additional motive for caution when sailing in the vicinity of cape San Thomé:—

"On the 29th November, 1834, his Imperial Majesty's frigate, *Principe Impérial*, steering S.W. by S., in the lat. of cape San Thomé, and longitude  $40^{\circ} 30'$ , sounded at 8h. a.m. in 32 fathoms; at 8h. 15m. in 9; and 8h. 20m. in 6,  $5\frac{1}{2}$ ; the ship running between five and six knots, a dark squally morning, with all set. No time was lost in shortening sail, and the small bower anchor cut adrift, when we found ourselves in  $4\frac{1}{2}$  fathoms, the frigate drawing 22 feet, and a heavy swell on at the time.

At daybreak, the shoals of San Thomé breaking very high, bore W. by S. distant one mile. At this time it cleared away, and we could see nearly 30 miles from the masthead; but no land was to be seen.

Mr. Bruce, H.M.S. *Diamond*, says of cape San Thomé in 1826,—“We anchored with the cape bearing W. by S.  $\frac{1}{4}$  S. distant  $4\frac{1}{4}$  miles; and the extremes of the breakers S.E. by E. and South, distant about  $2\frac{1}{4}$  miles. The latitude of the cape was  $21^{\circ} 57' 30''$  S., and longitude  $41^{\circ} 5' 45''$  W.; latitude of the breakers  $22^{\circ} 1' 45''$  S., and longitude  $41^{\circ}$  W. We went in close to the breakers, and found  $4\frac{1}{2}$  fathoms in the surf; but the current was so very strong, that with much difficulty we got out again. After this we endeavoured to find the channel, which is said to go round the cape, between it and the breakers. Here we discovered  $3\frac{1}{2}$  fathoms in what we supposed to be the passage; but the water was so much agitated, and the current to the southward so strong over the breakers, that no boat could live; and even a small vessel would encounter much danger in attempting the channel.

With respect to the dangers that were supposed to surround cape San Thomé, we were three days examining them round to the N.W., N.E., and S.E. of the breakers, and I am positive they do not lie further out than 7 miles from the cape, in either of the above directions; but we had no opportunity of going to the south-westward; however, Mr. Napier, Master of H.M.S. *Wellesley*, being sent from Rio Janeiro to ascertain their situation, was to the south-westward and has confirmed the above opinion; so that a ship falling in with this part of the coast during the months of April, May, or June, may make towards the land with safety, only taking care not to go into less than 10 fathoms when she is off the cape; she will then have a current running south-eastward, at the rate of two-thirds of a mile per hour.”

**ST. ANNE BAY.**—From cape San Thomé the coast trends south-westward and afterwards curves southward as far as cape Busios, a total extent of about 75 miles, and thus forms a large bay, named St. Anne, from some islands near its shore. This bay is said to be both deep and spacious, but it is not a desirable place to anchor in, the surf in rough weather being extremely violent. The coast in general consists of a white sandy shore, and there are but few objects along the land which attract particular attention.

Mr. Luccock has observed,—“When the sea is serene, and the ripple comparatively light, it eats away the sands lining the shores of the bay, and forms

On the ship running out E. by N. at the rate of two knots for three hours, we found the soundings very irregular, from 5 to 7 and 8 fathoms, and then lessening to 5 and  $4\frac{1}{2}$ , sand; and we got soundings off the shoals in 26 fathoms, having run off at least 20 miles.”

A writer in the *Nautical Magazine*, 1842, who signs himself “Mexicano,” says, in reference to the foregoing,—“I feel satisfied that no shoal on which a vessel could ground, over which the water would break, lies so far from the land as the one mentioned in the *Nautical* (as above), on the authority of the officers of the Brazilian frigate, *Principe Impérial*. With a foul wind, I stood in on the parallel of the shoal, with the lead going carefully and regularly. The soundings were not very regular, but we carried deep water far within the position where the shoal is represented to be, and with a good look-out could see nothing indicating a shoal, although there was a fresh breeze blowing at the time. I, also, when at Rio Janeiro, questioned several Englishmen commanding the Brazilian steamers trading on the coast. One of them in particular, a well-informed, careful man, showed me his chart, with many tracks well within and over the position of the shoal, and declared his firm belief that it does not exist. I would not, however, have it erased from the charts. Detached shoals are very difficult to find, and the navigator will do well to pass its parallel with caution, particularly in the night.”

a flatter beach, with a perpendicular boundary, wherein the laminated appearance of the sand is remarkable. To the southward the shore is covered with shingles, and when it meets the high rocks beyond the Rio Una, in the S.W. part of the bay, it becomes bold, stretches to the eastward, and forms point Buzios, named in some charts Cowries point. Near the mouth of the Una is the small secure bay of the *Armaçao*, or *Armazem*, which affords refuge to vessels baffled in their attempts to double the cape, and when the wind blows hard from East. The entrance is between two small rocky islands, named from their different appearance, the Beautiful and the Ugly. The anchorage lies to the southward of the entrance."

At about 15 miles westward of the extremity of cape San Thomé there is a small inlet, named the Barra Furada, through which boats may pass into the lakes behind the cape. In the vicinity of this inlet there is but little else than barren sandy flats, and a few fishermen's huts.

**Rio Macahé.**—The entrance to this river is about 35 miles westward of the Barra Furada, and immediately behind the St. Anne islands. It is about 70 yards broad, and said to be sufficiently deep to admit vessels of about 200 tons. The village consists of about 150 houses, among which are some large buildings, standing on the rising ground at the mouth of the river, near which a church and flagstaff will be observed. This place is principally resorted to by the coasters, as but few foreign vessels take cargoes for it.\*

To enter the Rio Macahé a pilot is absolutely necessary, as, we believe, the bar is a shifting one. It used to be the custom to hoist a flag when the entrance was safe, and possibly the custom may be retained. The following instructions for the port are old, still they may be useful in the absence of a pilot:—"In sailing in, a vessel should steer close to the south side of the rock, and when abreast it, let go the anchor, with about 15 fathoms of cable; but should she overshoot this berth, she should put the helm hard a-starboard, and run between the southern point, where there is a channel 8 feet deep and 2 miles long, with remarkably clear water. A little to the southward of the mouth of the harbour, and close to the shore there is a ledge of rocks which must be carefully avoided; but every other part appears clear of danger."

Off the south point of entrance to the river Macahé there is a small islet named Papagayos, outside which, distant one mile, is a sunken rock. A shoal with 3 feet least water on it, also lies at about 3 miles northward of the river's entrance and 1½ miles off shore; it is known as Hermes rock.†

\* The Rio Macahé, as well as port Frio, are stopping places for the small steamers that ply between Rio Janeiro and Campos. The latter is a flourishing village, 20 miles up the Parahiba river. (1844).

† The following information respecting the rock on which the steamer *Hermes* was wrecked, 21st August, 1862, near the port of Macahé, was published by the Brazilian Government:—*Hermes Rock* is about 12 yards in extent, N.N.W. and S.S.E., 4 yards wide, and quite isolated from the islands forming the Santa Anna group. It rises almost perpendicularly from the bottom, and its summit has three peaks, on the south-east of which are 4 feet, and on the two others 10 to 14 feet at low water. The bottom around is mud, and the depths 5 and 6 fathoms, excepting for 54 yards in a N.E. direction from the rock, where the depth is 4 fathoms and the bottom coral. N.E. and S.W. winds occurred during its examination, but the rocks did not break.

The church of Santa Anna stands southward of the centre prong of the Irii mountain is small, detached, has four peaks appearing like three prongs, the centre being the largest and highest, and rises inland a short distance south of the port of Macahé. Imbúro hill rises a little north of the town of Macahé, and may be known from the hills in its vicinity as being the highest, and its summit is covered with wood and inclines to the south. Deitado hill is in the same direction as the preceding one, a little more inland, and having a large spot on it is easily recognised.

*Directions.*—When bound to the northward from the anchorage off Macahe, to avoid the Hermes rock, do not steer to the N.E. until the vessel is eastward of the Santa Anna islands. If it is necessary to tack, in making the northern board, the church of Santa Anna should not be brought on with Irii mountain, especially when the vessel is on the meridian of the islands.

It is high water, full and change, at port Macahé at 2h. 30m.; springs rise 9 feet.

The coast southward from Rio Macahé is skirted by a dangerous reef, as far out in some places as  $1\frac{1}{2}$  to 2 miles from shore.

From the Rio Macahé water in any quantity may be procured, and refreshments, such as the country produces, may be obtained at the village, by giving a few days' notice. It is said that at times the water of the river on running towards the south-west passage of the St. Anne isles appears much discoloured, as if running over a sand-bank, but that it changes to its proper colour when the wind shifts. Such appearances are attributed, not to shoals, but to rains in the interior, and the operation of the wind.

*St. Anne Isles.*—This group of islets, abreast the entrance of Rio Macahé, distant about 5 miles, consists of two principal islets, about a third of a mile apart; the largest and highest, a mile in extent and 500 feet high, is the south-westernmost of the two. There are also two barren rocks at a short distance to the north-east of the islets and another lying about half-a-mile to the south-west of them.

According to the local traders, the anchorage in the channel between them and the continent is so safe that vessels may repair any damage and even be careened. Wood and water may also be obtained here. Southward of the islands, at 4 or 5 miles from the land, the depth is 17 to 18 fathoms, on a bottom of ooze.

In approaching the St. Anne islands from northward, and running down the coast from the Barra de Furada, the soundings are regular, there being 9 and 10 fathoms water on sand at the distance of 5 or 6 miles from the land, which increases further out to 20 and 22 fathoms—mud; the latter being about 15 miles from the shore. This sort of bottom extends across the bay to cape Busios, the depth, however, deepening to 24 and 25 fathoms. It may be remarked generally, as an indication of the vessels approach to land, that the soundings change from mud to sand.

The anchorage is off the north-west side of the isles in 7 and 8 fathoms, and

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From the rock the church of Santa Anna bears W. by S.  $\frac{1}{2}$  S.; extreme north end of the Santa Anna islands S.S.E., distant  $3\frac{1}{2}$  miles; centre of Papagayos island S.W.  $\frac{1}{2}$  W.,  $3\frac{1}{2}$  miles; Santo Domingo hill N.  $\frac{1}{2}$  E.; and the summit of Imbúro hill N.W.  $\frac{1}{2}$  N.; in the latter direction the beach is distant only  $1\frac{1}{2}$  miles. The position of the rock is given as lat.  $22^{\circ} 21' 10''$  S., long.  $41^{\circ} 41\frac{1}{2}'$  W. of Greenwich.

is well sheltered from easterly and S.E. winds, but exposed to the S.W. and N.E.; with the latter, however, there is seldom much swell. The proper route to this anchorage is by the S.W., through a clear passage, with 10 and 12 fathoms close to the isles, near which is the deepest water.

From off the north end of the largest isle a sand-bank stretches to the S.W. and W.N.W., and has 3 to 5 fathoms over it, the greatest depth being at above halfway across the passage toward the main. This therefore impedes the passage from the N.E.; but the ship may beat out of the S.W. channel. Large vessels attempting the latter should carefully keep the south-west end of the larger island to the eastward of S.E. because the water shoals suddenly on the south-west side of the bank, and likewise toward a sandy beach on the large island.

About St. Anne isles the soundings are regular, excepting on the bank which extends westerly from the north end of the larger island. This bank is steep-to on both sides, the water suddenly shoaling from 7 to 4 and 3 fathoms, bottom of mud, but on the outside of the islands sand only.

From the anchorage, in 7 fathoms, at three-quarters of a mile from the sandy beach on the large island, the bearings taken by the *Jaseur* were, the S.W. point of the large island South; the northern part of the same, E.  $\frac{1}{2}$  S.; the outer point of the south-west island, N.N.E.; and the islet Ferro, at the entrance of Macahé river. N.W. by W.  $\frac{1}{2}$  W. Large ships should bring up further to the southward, keeping the south-west point of the large island about S.E. one mile, where there will be found 7 or 8 fathoms, at a sufficient distance from the shoal.

It is said that there is not at any time a difficulty in gaining this anchorage, but that it should be remembered that the passage to it from the N.E. is scarcely of sufficient depth for large vessels.

About the middle of the sandy beach of the large island there is a passage through the trees to a well of scanty and indifferent water. Firewood may be obtained here in any quantity close to the beach.

**Morro San Joao &c.**—This mountain is a conspicuous mark for the bay; it is about 2700 feet high, and may be recognised by its insulated position on the coast, the undulation of its summit, and its distance from the chain beyond it in the interior. It is situated on the north bank of the river of the same name, in latitude about  $22^{\circ} 33' S$ .

Another mountain peak, about 5800 feet high, visible at a great distance in clear weather, is the Frade de Macahé. It is situated about 20 miles N.  $\frac{1}{2}$  W. from the Morro San Joao, in latitude  $22^{\circ} 13\frac{1}{2}' S$ , and it will be noticed as being surmounted by another hill which leans very much towards the north.

**Anchor Isles.**—This is a group of islets lying 7 leagues S. by W. from the St. Anne islets. They consist of two islets and a large white rock lying to the southward of the inner one, and apparently connected to it by a reef. The outer islet lies 5 miles in an E. by S. direction from cape Busios. Between the islets there is a channel of 23 and 24 fathoms. The easternmost islet resembles a cardinal's hat. Small vessels, it is said, may pass between these islets and the land; and it is stated by the pilots that the depth of water in the passage may probably be sufficient to allow vessels of every class to pass through.

Northward of cape Busios is Branca, or White island;  $2\frac{1}{2}$  miles W. by N. from White island is Feia islet, off which a dangerous sunken rock lies, distant about one mile N.E. by E.; \* then follows a beach of sand, which is skirted by a reef, and contains two or three small rivers.

\* This rock was discovered by Lieut. Crofton, R.N., in April, 1850, and was thus described

**Papagayos Bay.**—The coast between cape Busios and Frio island bends to the westward and forms a bay named Papagayos or Parrot's bay. It has an extent of about 14 miles, and has not been examined, so that it should be entered with care. In the bay there are a number of islets and rocks.

At about 6 miles to the northward of Frio island, and at the north end of a low sandy beach, there are a small fort and flagstaff; these are on the south side of the entrance to a small river which enters the sea near the village of Papagayos.

## CAPE FRIO TO RIO JANEIRO.

**CAPE FRIO and Light.**—Cape Frio is a high rugged headland, situated in latitude  $28^{\circ} 0' 42''$  S. longitude about  $41^{\circ} 57' 22''$  W. It is the south-western extremity of an island lying a short distance from the coast, and forming with it an excellent harbour, in which there is good shelter, although somewhat exposed to the north-east. The summit of the island is sufficiently elevated to be visible in clear weather about 40 miles off; on approaching, it will be observed to be irregularly covered with trees, and to show many places destitute of verdure.

On Focinho do Cabo, the southern extremity of Cape Frio island is a lighthouse, which exhibits a light *flashing* every  $1\frac{1}{4}$  minutes, the duration of the eclipses being 45 seconds. The light is elevated 552 feet above the sea and visible 25 miles, over an arc of  $225^{\circ}$  (N.E. southward to West).\*

The island of cape Frio is about  $2\frac{1}{4}$  miles in extent. When seen from the East or West it presents two mountains, estimated to be 1570 and 1300 feet high; the southern is the smallest, both in height and breadth. On a N.N.E. and S.S.W. bearing these two mountains apparently form one mass, with a double summit like two small points; at the same time a little conical islet will be seen at one or two cables E.S.E. of the cape. At the south end of the island there is a small cove in which the ship *Thetis* was wrecked in 1830.

The coast about cape Frio is so very steep, that at a mile distant, in any direction from North round by south to W.S.W., vessels will find from 30 to 50 fathoms, on a bottom almost always of mud.

Captain Beechey, R.N., has remarked, that "Cape Frio is a headland which all vessels bound to Rio Janeiro should, on several accounts, endeavour to make. In fine weather the south-east winds blow home to the cape, and gradually fall

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by him:—"It lies with the high peak of Ancora touching the north-east point of White island S.  $65^{\circ}$  E.; St. Anne's islands N.  $28^{\circ}$  E.; centre peak of the high land north of the Rios das Ostras N.  $38^{\circ}$  W.; and the north-east point of Frio S.E.  $4^{\circ}$  W. (?), one mile. The rock is 20 feet in diameter, and is just awash at low water, having soundings around it of from  $7\frac{1}{4}$  to 10 fathoms within the distance of 10 feet. Ancora, open to the N.E. of White island, clears it at half a mile to the N.E., in 13 fathoms."

\* Running down towards cape Frio, it is advisable to keep about 10 miles to the southward of its parallel, in order to prevent getting into the bay to the northward of the cape; a considerable swell sets into this bay during E.N.E. winds which are most prevalent. At night no one must trust to see the light at any great distance, it being placed so high as frequently to be enveloped in the thick fog, or haze, which hangs over the high land, particularly in summer.

into either the land or the sea breeze, according to the time of day, though the prevailing wind off it is from the north-east; with either of these winds a ship can proceed to her port. The southerly monsoon, which, while it blows, materially facilitates the navigation along the coast to the northward, scarcely affects the wind close in with the cape. The greatest interruptions to which they are liable are from the pamperos, which in the winter blow with great violence from the river Plate, sweep past Rio Janeiro, extend to the before-mentioned cape, and often beyond it, to a considerable offing. It was during the influence of one of these gales that we approached cape Frio, and had no sooner opened the land on the western side of the promontory, than we were met by a long rolling swell from the south-west, gusts of wind, and unsettled weather; and at noon encountered a violent squall attended by thunder and lightning, which obliged us to take in every sail on the instant. Towards sunset the weather cleared up, and we saw cape Frio N.W. by W., very distant."

**Cape Frio Harbour**, or the passage between cape Frio island and the shore, is occasionally used by vessels of a moderate size. In it there is good depth of water and anchorage for large vessels, but care is required to avoid the bank of 6 to 9 feet, which extends off from the shore, and joins the island in about its centre; this bank has  $2\frac{1}{2}$  fathoms close to it, and the sea breaks upon it during the prevalence of N.E. winds. It is high water here on the days of full and change of the moon at 2h. 40m., and spring-tides rise  $4\frac{1}{2}$  feet. South-westerly winds generally increase the depth of port Frio by 2 or 3 feet; and it has been remarked that outside the harbour, south-west and north-east winds produce N.E. and S.W. currents, having a strength of from  $\frac{1}{2}$  to  $1\frac{1}{2}$  knots. With south-westerly winds there is a S.W. eddy in-shore, and the currents usually precede the wind.

Baron Roussin says,—"The passage between the island of cape Frio and the shore has a N.E. and S.W. direction, and is but little frequented, because of the narrowness of the southern outlet; but the depth is sufficient there for large vessels. In adopting it there is only this trifling advantage, that in rounding the cape vessels would prolong their route 2 or 3 leagues.

The northern entrance is much more spacious than the channel itself, as it forms a commodious bay, secure from all winds except those from the N.E.; but even with these you may secure yourself by approaching towards the little island Dos Porcos, which lies to the northward of the entrance. The ground at this anchorage holds well, and is useful to coasting vessels, who can get out by the passage either to the northward or southward, according as the wind may favour them. In time of war they will then be put upon their guard by means of a signal-post, standing on a little hill to the westward of the cape, which, communicating with Rio Janeiro, announces whatever occurs at this port."

Cape Frio harbour was thus described by Captain Thomas Martin, R.N., in 1825:—"The harbour is situated on the north-west side of cape Frio island. The principal channel leading to the anchorage is between the cape and the island of Porcos; the soundings are regular, having from 20 to 12 fathoms in it, sand and mud. There is a narrow passage on the northern side of Porcos island, with 10 and 12 fathoms in it; but it is so small as to be unfit for any but small vessels, with a fair wind. In the south-west end of the harbour there is a passage between the cape island and the main; but a bar runs across the harbour inside, with only 8 or 10 feet over it. The large passage on the south side of Porcos island is nearly a mile wide: the anchorage is good, but open from E. by N. to E. by S.; there is also a considerable swell in it with the E.N.E. winds, which are

most prevalent. A fort stands on a rocky point at the north end of the deep sandy bay in the upper part of the harbour, and entirely commands the principal entrance to the anchorage. A little within this fort is a village, occupied mostly by fishermen. There are some fine sandy places here for hauling the seine, and this appears to be the chief occupation of the inhabitants."

From cape Frio to Rio Janeiro the distance is about 65 miles, and the coast between is very imperfectly known but believed to be mostly low and sandy; inland the country rises to a series of elevated and uneven mountains, presenting an interesting and picturesque appearance. The hills, which in detached groups surround the bay of Rio Janeiro, extend into the interior of the country. Between capes Frio and Negra, 36 miles westward, the sinking of the land is remarkable, presenting no object on the coast, except here and there a few little hillocks on a flat sandy shore, with some scattered bushes. Within this low flat shore are extensive lagoons communicating with the sea by openings, none of which are of any utility to navigation. At the distance of 2 leagues from this part of the coast the depth is from 30 to 40 fathoms, over a bottom of mud, the soundings increasing the further vessels proceed from the land: at 10 leagues off they average from 76 to 90 fathoms, the ground being coarse sand mixed with rocks and mud.

As Rio Janeiro is approached, soundings may be obtained at a considerable distance from the land, but the depth is very great: 10 to 15 leagues off it varies from 70 to 90 fathoms, and lessens gradually as the coast is approached, the bottom being of sand, gravel, broken shells mixed with rocks and mud.

**Cape Negra**, at about 36 miles from cape Frio, is the first prominent point to the westward of the cape. It is formed by a small hill, backed by the highest mountains that there are between cape Frio and Rio Janeiro; this circumstance, joined to the dark verdure with which cape Negra is covered, and which has occasioned it to be so named, makes it easily known. It may be approached without danger, as within 3 miles of it there is a depth of from 20 to 30 fathoms, on a bottom of soft mud.

**Maricas Isles.**—At about 13 miles westward of cape Negra are two small islands, named the Maricas, which are situated about a league from the coast. They are of moderate height, steep to on the south side, and may be safely approached. A dangerous rocky patch lies at about a mile north-eastward from these islets; it must be carefully avoided by vessels seeking shelter in their vicinity.

It is said that there is anchorage off the western side of the Maricas islets, in 17 fathoms, coarse sand and mud, with the rock off the southern island bearing S.E.; the passage between the isles E.S.E.; and the northern end of the isles E.N.E.  $\frac{1}{2}$  E. The general depth westward of the islands is 10 and 12 fathoms close to the beach, with 14, 15, 16, and 17 fathoms at the distance of a mile to a mile and a half. Between the islands and the main are 13, 12, 11, and 10 fathoms, close up to the beach.

As this place is sheltered from the S.E. round by north to W.N.W. and more west, with a fine sandy bottom, it may be considered as safe when the wind is to the northward and eastward, or to the northward and westward.

On the eastern side of the isles the sea commonly breaks with great violence, so that landing there is very difficult. The best place is near the north-west end of the large isle. In a small sandy bay, on the low part of this isle, is a well with good water, but it cannot be obtained without trouble in getting it off.

From the Maricas islets to Rio Janeiro the distance is about 14 miles. In approaching the latter harbour, the various mountains, some of which are of great height, will be sure to arrest attention, as well from their dimensions as their peculiar sugar-loaf form; the light on Raza island before the entrance will also be an excellent object in the night-time, as it can be seen at a considerable distance.

**RIO JANEIRO.**—The bay of Rio Janeiro is very spacious, and one of the most magnificent in the world. It extends from 3 to 4 leagues in various directions, and is surrounded by mountains of great elevation, which are covered with the richest verdure, and terminate in an easy declivity to the sea: its shores also are scattered with a number of villages, plantations of all sorts, country seats of elegant appearance, and surrounded with trees. Many islands equally wooded and inhabited, ornament and diversify the surface of this little inland sea; and there is not a more beautiful residence on the globe, or one bearing an aspect more imposing or agreeable. The proper anchorage for large vessels does not extend far to the northward of the city; but the whole of the bay is sufficiently deep to be navigated by small vessels and boats.

Of the mountains in the immediate vicinity of the bay of Rio Janeiro, that named La Gabia is perhaps one of the most conspicuous, as it is visible from all points of the offing between East and S.S.W. It is situated about 3 leagues W. by S. from the entrance to the harbour, and will be recognised by its flat top, and also by its summit appearing rather larger than that part of the mountain which is a little below it; hence it has somewhat the appearance of a ship's top and cannot readily be mistaken for any other mountain in the neighbourhood. Another mountain named the Pao de Assucar or the Sugar-loaf, is equally remarkable, and will be readily discovered by its form; it lies 8 miles N.E. by E. from the Gabia, and is generally considered to be one of the principal marks for the entrance to the bay, but being lower in altitude than that mountain cannot be seen at so great a distance. The Corcovado, between the Gabia and the Sugar Loaf, is also a mountain of great height; it has a sharp peak, and according to the observations of Captain Beechy, R.N., its summit is 2306 feet above the sea.

The entrance to Rio Janeiro between fort Santa Cruz and the Pao de Assucar, is about a mile wide, and has a depth of 12 to 15 fathoms: outside of this, however, the depth is not so great, as there are as little as 6½ fathoms when abreast of the islet Tucinho, or between it and the fort.\* When within the fort the water deepens to 19, 17, and 15 fathoms, and gradually decreases as the city of Sebastian, or Rio Janeiro, is approached.

Captain Wilkes, U.S. Navy, has made the following remarks on the approach to Rio Janeiro, and the navigation of the coast in the vicinity of the harbour generally:—

“The approach to cape Frio is safe at all times, the lighthouse now established

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\* Commander Mouchez, French I.N., reports,—that the depth of water on the bar of Rio Janeiro, on a line north and south with fort Santa Cruz, has decreased to the extent of about one fathom; formerly there were 6½ to 7 fathoms, but at present (1867) not more than 6 to 6½ fathoms; to the eastward of this line there is a similar decrease; while to the westward (in the direction of the Sugar-loaf) there is an increase of depth.

affording all necessary facilities to the navigator to advance without fear or apprehension at night. When the light cannot be seen, from haze or thick weather, the soundings, as well as a fall in the temperature of the water, will indicate a proximity to the land. The soundings extend some 25 miles, and are of ooze and shells.

It has been generally supposed that it was necessary for vessels to await a favourable wind to enter and depart from Rio Janeiro, but this is a mistake; there is no difficulty whatever in vessels departing or entering, at any hour, and with any wind and favourable tide. The best time, however, to enter is during the day, when the sea breeze is fresh; it ordinarily dies away at sunset, and then remains calm until an early hour in the morning, when a gentle land breeze prevails until about 9 o'clock.

So safe and free from danger is this harbour, that pilots are unnecessary; but it is requisite to pay attention to the tides, which at times run with great velocity. There are times, too, when squalls prevail from the south-west to north-west, which sometimes blow with violence; and I have been informed that a heavy sea has been experienced at the harbour, so much so as to prevent any landing at the Great Quay, and rendering it necessary for boats to seek the upper or mercantile harbour to land, where it is practicable at all times. Vessels lie at anchor, and lighters are employed to land all goods, thereby causing a detention, as well as expense, in discharging their cargoes.

The situation of the upper harbour is well adapted for the erection of wharves; and they might be constructed with little expense, and would be entirely protected from the influence of the winds and sea by the small islands of Enxados and Cobra.

The tide in the harbour of Rio ebbs and flows 4½ feet; and it is high water at 2h, 15m. p.m., full and change. A tide-staff was kept during the time of our stay, and marked hourly, night and day. The ebb often runs very nearly the whole day, and is always represented as much stronger than the flood.

Vessels, after leaving the harbour of Rio, would do well to follow the example of the coasters, and stand down along the northern shore towards cape Frio; for they would thereby not only preserve the land breeze, but also be assisted by the counter current which sets along the shore, and save much of the time that is frequently lost by standing off to the southward and eastward, when not only contrary winds are met with, but frequently calms of some duration. The coast is free from dangers, and a vessel of any size may approach it within a short distance."

The city of **Sebastian**, or **Rio Janeiro**, is situated on the western side of the entrance to the bay, and is the most important town in Brazil. It is built on level ground, in the form of a parallelogram, and has a fine appearance from the harbour, as well from the number of its public buildings as from the regular manner in which the streets have been laid out, being generally at right angles to each other. The older portion of the town, or that adjoining the sea, is divided on the west from what may be called the new town by a large open space the Campo da Honra. The style of architecture is in general mean, resembling that of the older parts of Lisbon; and though great improvements have been effected since the emigration of the Court of Portugal to Rio in 1807, a great deal remains to be done before it be entitled to rank even with a second-rate European town. The houses which are mostly of granite, or of granite and wood, are seldom more than two stories in height, rough, or whitewashed, with red-tile

roofs. The mildness of the climate, which is here a perpetual spring, rendering artificial heat unnecessary, there are no fire-places, except in the kitchens, and, consequently, very few chimneys, which to a stranger from Europe, gives the city a bald and, as it were, truncated appearance. The windows in the second story generally open upon iron verandas, the *jalousies* having been removed by order of government. Inside the houses it is usual for all the apartments on the same floor to communicate above the partitions, which do not extend to the ceiling. This, though it destroys privacy, is advantageous, by allowing that free circulation of air so important in hot climates.

There are about 40 churches in the city; but none of them can be called fine buildings, or are worth the notice of travellers from Europe. The cathedral or church of Nossa Senhora da Gloria, on a lofty hill on the south side of the city, is a conspicuous object from a distance, and especially from the bay. There are also several charitable institutions.

Water is conveyed into the city from a neighbouring lofty hill, called the Corcovado, by an aqueduct; thence it is conveyed to public fountains in different parts of the city; and a good many persons earn a livelihood by carrying water from these fountains to private families. Nothing, however, would contribute so much to the cleanliness and health of the city as an increase in the supply of water, and its distribution by pipes to private houses. The town is very indifferently lighted. There are but few inns and hotels, and those mostly very inferior: they are wholly for the accommodation of strangers, being rarely visited by the townspeople.

The royal palace forms two sides of a *largo*, or oblong space, opening to the bay, near the principal landing-place. It consists partly of the old palace of the viceroys, and partly of a convent formerly belonging to the Carmelites, and is wholly destitute of architectural beauty. Among the other public buildings may be specified a theatre, the exchange, the old college of the Jesuits, and the episcopal palace, and royal villa of Christovao, in the environs.

The imports into Rio from the river Plate consists of immense quantities of dried beef, tallow, hides, and grain. Those from the United States of America are salt provisions, flour, furniture, pitch, and tar. The imports from the mother country are principally wine and oil; from Sweden iron, which is preferred to English iron, on account of its superior ductility. The exports consist of sugar, rum, ship-timber, cabinet woods, hides, tallow, indigo, and coarse cotton cloths; these latter are sent in immense quantities to the river Plate, for a sort of clothing worn by the natives. Besides the above, are the more precious articles of gold, silver, diamonds, topazes, amethysts, tourmalines, chrysoberyls, aqua-marinas, and wrought jewellery. The manufacture of cochineal is also carried on here: and there are considerable works for manufacturing whale oil.

The trade of Rio is very extensive, and has increased rapidly during the last few years. It is now by far the greatest mart for the export of coffee.

**Islands before and about the entrance,**—The situation of these islets can be best seen by a reference to the chart, as also the soundings about them. They are represented to be in general steep-to, and to be separated by channels sufficiently deep for large vessels. The two outermost are named Raza and Redonda.

**Light.**—Raza island is low, and when viewed from the eastward appears not unlike a slipper, with the sloping side northward. On it is a lighthouse 50 feet high, which shows a light revolving every  $2\frac{1}{4}$  minutes at 315 feet above the sea, visible 10 to 14 miles. The light appears alternately red and white.

Redonda island is situated about 2 miles W. by S. from Raza, and will be recognised by its resemblance to a haycock. On its western side there is a detached islet or rock, and at about a mile from it, in a S.W.  $\frac{1}{2}$  W. direction, there is a dangerous reef. Between Raza and Redonda the depth is considered to be about 26 fathoms.

Raza and Redonda are neither of them more than a third of a mile in extent. They are, however, excellent objects to vessels making the harbour, and Raza especially, on account of its lighthouse. After rounding cape Frio, a vessel should steer West, keeping at a distance of not less than 10 miles from the coast, until the islands are made, after which a course can be steered into the harbour. Redonda, in consequence of its superior height, is generally seen first.

At about 2 miles north of Redonda, are the three islets Comprida, Palmas, and Cagada. On the south side of Cagada, there are some detached rocks above water, and a reef also extends from the north end of Comprida, so that between these two islets there is not a safe navigable channel. At about half a mile N.W. from Cagada there is a reef of rocks. The depth between these islands and the shore is 8 to 14 fathoms, and between them and Redonda 26 fathoms, sand and shells.

The islets Pay and May stand on the eastern side of the entrance, and are steep, so that they can be pretty closely approached; but a reef extends off the eastern side of May, rendering the channel between it and the shore very narrow. Between the islands there is a channel of 21 fathoms water, named the Nereus channel; and between May and the islet Menina, situated close to the shore, there are 20 fathoms. The depth between Pay and Raza islands is about 25 fathoms, gray sand and mud.

On the western side of the entrance there is an island named Tucinho, having between it and the shore a narrow passage of 12 to 9 fathoms on a sandy bottom. Immediately under the Pao de Assucar, and connected to it by a sandy flat, is the island San Joäo, with its fortifications; and beyond this is the little islet Laage, which is also fortified. Although there is a clear passage of about 12 fathoms water between Laage and San Joäo, it is not considered prudent to make use of it, as it is very narrow and exposed to sudden gusts of wind from the Pao de Assucar, and other mountains in its vicinity; the current also is irregular, and the ground rocky.

Further in the entrance to the harbour, is the islet Villegagnon, with its fort; and beyond this are the islets Cobras and Ratos; these latter are situated immediately before the city.

*Lights.*—A *fixed* light is shown from fort Santa Cruz, east side of entrance to the harbour; visible 6 miles. Also, a *fixed red* light is exhibited on Calhabouco point, occasionally, when the steamers are plying.

*Directions.*—In approaching Rio Janeiro, it is usual to make the land about cape Frio, but the cape ought to be made only during the northern monsoon, and when coming from northward or eastward, as in all other cases such landfall will be disadvantageous, causing a loss of time, and delaying the voyage.

In the southern monsoon, the Ilha Grande, Le Morro de Marambaya, and, above all, the mountain La Gabia, are the best objects to make, as they can be seen at a sufficient distance to establish a vessel's position.

There is also another mark by which the entrance to Rio Janeiro may easily be recognised—namely, the appearance of the mountains which surround the bay. When approaching from between E.S.E. and S.W., the configuration of

their summits shows very clearly the figure of a man lying down from the W.S.W. to the E.N.E.; the mountain La Gabis forming the head, and the Pao de Assucar the feet. When the tops of these mountains are free from clouds and vapour, you can scarcely fail in being struck with this appearance.

In approaching Rio Janeiro from eastward, it will be prudent to steer at some distance from the coast between cape Frio and the harbour, because when the wind blows from the S.W. by south to E.S.E., there is an incessant swell of the sea which in bad weather renders anchoring unsafe. It is not considered advisable for vessels to approach the islands at the entrance of Rio Janeiro, until the sea-breezes are well set in; and then they must contrive to reach their anchorage before night. Without this precaution; they will be exposed by stopping among the islands, or at the entrance, during the calm which intervenes between the sea and land-breezes; or encounter the latter, which directly opposes the entrance, and is often accompanied by gusts of wind, which are sometimes violent, more especially at the full and change of the moon.

If, notwithstanding the precautions thus taken, the land-breezes should set in before the vessel has entered the harbour, and she sails badly, or if the current, which almost always runs out, will not allow her to reach the inside of the bay by tacking, it will then be more advantageous to remain outside of the island than to anchor among them. The space for tacking is very limited, especially during the night; the ground is hard, and the swell of the sea is the stronger and more troublesome the nearer a vessel is to the entrance. The strongest gusts of wind from the land-breezes seldom extend further out than to Redonda or Round island.

When entering or leaving the harbour, the passage between Raza and Pay islands is generally preferred, as it is the widest channel among the islands, and contains the most water. There are other passages between the islands, but they are not frequently used by strangers.

To make the harbour through the channel between Raza and Pay islands, the course to fort Santa Cruz, from a position about a mile east of Raza island, is N.  $\frac{1}{2}$  W.; if the passage between Raza and Redonda be preferred then from about midway between them, the course to the same fort is N. by E.  $\frac{1}{2}$  E., and the distance about 8 miles. In this latter course a vessel will pass eastward of the islets Comprida, Palmas, and Cagada, and also pass the island Tucinho at the distance of about a third of a mile; the soundings also will be noticed to decrease gradually from 32 to 7 fathoms, on a bottom of fine gray and white sand, stiff ground. In both channels there is no known danger other than is apparent.

At the entrance to the harbour the least water is 6  $\frac{1}{2}$  fathoms; after which the depth increases so rapidly, that from one cast of the lead in 11 fathoms, the next may be in 14; the latter will be very near to fort Santa Cruz. The western side of the entrance, that of the Pao de Assucar, can also be closely approached, but in running in, it is considered more advisable to borrow towards port Santa Cruz, as vessels will be enabled to answer the signals from thence, and also keep well clear of the islet Laage and its fort; another advantage also is this, that they will in some measure avoid the effect of the current, which sometimes runs to the N.W. when the tide is rising,\*

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\* M. Barral observes, that in approaching the harbour when you have left Raza island at the distance of about two miles, the small light on fort Santa Cruz will be perceived,

To proceed from fort Santa Cruz into the bay, the passage is between the fort and Laage islet; the channel between Laage and San João although sufficiently deep for large vessels, not being recommended. From a berth of about 3 cables off fort Santa Cruz the direct course to the anchorage for ships of war is N. 35° W. (*true*),\* until E.N.E. of fort Villegagnon, which may safely be passed at the distance of 3 cables. From this spot steer for Rat island, and, having now arrived before the city, choose anchorage in from 19 to 10 fathoms, bottom of mud; only observing not to bring the Sugar Loaf to the westward of fort Villegagnon. The best place for ships of war is E.N.E. of the palace, south of an imaginary line from Rat island to the principal church of the city; the bottom here in from 14 to 18 fathoms is excellent: here you will avoid a small rocky bank, lying at 2½ cables E.N.E. from Ratos island.

The isle Cobras, or Serpent's isle, is situated to the westward of Rat island. If a line were drawn from the flagstaff of fort Villegagnon to the isle Cobras, it would separate the depths proper for large vessels from those of 4 to 2 fathoms, which are frequented only by coasters and merchant vessels.

*The anchorage for merchant ships* adjoins the city. The larger ones arrive at it by passing to the northward of Cobras island; they are separated from the Men-of-War road by a shoal bank, on which the sea breaks at low water, spring-tides, when the winds from the offing are violent.†

It is usual to moor north and south in the bay of Rio Janeiro; but it seems preferable to moor N.E. and S.W.; this direction, being nearly that of the flood and ebb, renders it easy to lay the vessel athwart the land and sea-breezes, which are almost the only predominant winds. This will in summer be found necessary; for at that season the heat is, at times, almost insupportable. A hawser, carried alternately from one buoy to the other, according to the wind, will gain this advantage, so important for the salubrity of the vessel: the flood-anchor to be on the port, and that of the ebb on the starboard side.

*The land and sea-breezes* ordinarily divide the 24 hours. The first begins in the evening, continues all night, and ends at about nine or ten o'clock in the morning. One hour of calm succeeds this, and generally at about 11 the sea breeze penetrates into the bay, and continues until sunset. The strength of these breezes is not uniform; and at times there are total interruptions; the calm, at times, will prevail for days together, or be varied momentarily by breezes without any fixed direction; but such circumstances are of rare occurrence.

*The tides* are not regular, nor of equal duration: as the ebb generally runs much longer than the flood, more especially after heavy rains. The ordinary velocity of each rarely exceeds seven-tenths of a mile in the hour; but at times

and may be kept in view in making the entrance. It is, however, frequently the case in the night, that vessels are obliged to anchor outside the harbour, between Pay and Tucinho islands, in consequence of the calm which generally prevails at that time;—when necessitated to do so, it is better to approach nearer to the eastern coast than to the western, because of the swell of the sea which is usually prevalent on the latter coast. The harbour can be entered on the next day with the sea-breeze, which seldom fails.

\* The variation of the compass is now (1872) 2° 35' W.

† A small rock (Lecky rock) lies at about one cable E. by S. ¼ S. from the jetty on the east point of Isle das Enchadas (The Coaling island); it is 50 feet in diameter, with 2½ fathoms on it at low water springs, and is steep-to on all sides.

it may run at the rate of a mile and three-tenths, principally during the ebb. The time of high water on the days of full and change of the moon, is at 2h. 45m., and the vertical rise of tide is  $4\frac{1}{2}$  feet; neaps only 3 feet.

The safety of the anchorage is nearly uniform, and is very rarely disturbed by winds causing serious accidents.

There are many landing-places at the quays before the town. Some are simply slopes, or hardways, others have stairs. The convenience of their use depends on the state of the sea, which is seldom so agitated as to impede the communication between the shipping and the shore; but the filth of the town at these places renders the approaches at all times disagreeable.

Vessels in the road generally take their water from a large fountain erected on the quay of the Place do Mar, before the palace; but this water is not very wholesome, as it frequently causes dangerous colics in the beginning of its use.

The stay made in the road of Rio Janeiro, as in most roads subject to a high temperature, occasions on the ship's bottom the adhesion of a large quantity of barnacles and other marine productions, which quickly grow, and very soon cover all the sheathing; these impede the velocity of the vessel, corrode the copper sheathing in a very sensible degree, and must therefore be frequently cleansed off. In the bay fish are not very abundant, on account of its being so much frequented, which disturbs and frightens them away. The consumption of this article is also attended with some danger, on account of the great number of vessels sheathed with copper constantly frequenting the bay; but shell-fish especially ought to be avoided.

*In sailing out of the bay*, the most simple precautions are necessary; indeed it will be quite sufficient to attend to the land-breezes and the ebbing of the tide, allowing them to carry the vessel along: even the ebbing is not absolutely necessary, if the breezes have the strength they usually acquire almost every day during certain hours. To be better prepared for getting under way, vessels sometimes, on the evening before their departure, get on the side of the bay which faces the town, by which they avoid any obstructions in the Road properly so called; and some take advantage of the strength of the land-breeze, but this is not absolutely necessary, for you may easily set sail from any part of the usual anchorage. The route for going out is the same as that we have given for entering. Steer so as to keep at about 3 cables eastward of Villegagnon island, and at the same distance eastward of fort Laage; then range along within hail of the fortress of Santa Cruz, taking care in this track to go nearer to the east side of the coast than to the other: these are the only precautions necessary to be observed.

As it is usual to weigh anchor in the morning, it is probable that vessels will have the benefit of the land-breezes, at least for four hours, which will enable them to fetch outside of all the islands at the entrance of the bay: and having arrived at this part, it is indifferent which way they tack. Should the sea-breeze come on before getting outside of the islands, this circumstance will be of little consequence, the passages between them being, with scarcely an exception, open. Should a calm be experienced between the breezes, it will be advisable to anchor; in which case choose a favourable position, so as to get under sail again with the first breeze that comes on. After getting clear of all the islands, steer at convenience.

**Additional Directions.**—Captain Hewett, R.N., has given the following directions for the harbour of Rio Janeiro:—

"The immediate entrance of the harbour of Rio is known by two lofty peaks, one on either side: the western resembles a sugar loaf; it bears that name, and differs from every other on the coast (for there are many) by the inclination of its summit to the westward.

It might be too far advanced a preference ought to be given to remaining under way, rather than to anchoring without the harbour, the ground being rocky, and much exposed to a heavy rolling swell, which increases as it approaches the bar, the shoalest water on which is about  $8\frac{1}{2}$  fathoms. The certainty of the sea-breeze before noon of the following day, and the tempestuous and general violence of the land-breeze, accompanied by heavy rain, &c., particularly at the full and change of the moon, render necessary the precaution of standing off and on, from and to Redonda island, for to it the violence of squalls seldom extends.

The *flood-tide* in the harbour is of shorter duration, and of less force than the ebb, against which and a strong land-breeze our ship, the *Inconstant*, turned in, to the astonishment of the Portuguese; an effort never before attempted. After violent rains the rise of the water in the harbour has very little influence over the ebb-tide, except diminishing its strength. The ebb has been known to run a whole day without intermission; the current strongest on the western side, but an eddy flood will sometimes be visible on the eastern side, when the water is observed to rise.

The entrance to the harbour, between forts Santa Cruz and San João, is in breadth, three-quarters of a mile. The passage between San João and Laage or Square island, situated immediately in the entrance, should never be attempted, although the greatest depth of water is to be found there; the narrowness of the channel, the likelihood of the wind's becoming variable under the Pao de Assucar or the Sugar-loaf, the irregularity of the tide, with the rockiness of the bottom, if compelled to anchor, render it dangerous, if not impracticable. The true channel is on the eastern side of Laage island, to abreast of which, from the bar, the water gradually deepens from  $8\frac{1}{2}$  to 21 fathoms; and when a little past it, the ship's head being N.N.W., soundings are lost for a short time, with the common hand-line.

Leaving fort Villegagnon (also on an island) on the left hand, the best anchorage is obtained for vessels of war abreast the city, with the flagstaff of Villegagnon just open to the westward of the Pao de Assucar; by taking this precaution a small bank very dangerous for cables, will be avoided. This bank is situated about  $2\frac{1}{2}$  cables from Rat island, in an E.N.E. direction; it is circular, about a cable in diameter, and very rocky; the mark for  $4\frac{1}{2}$  fathoms, which is the shoalest water, is Rat island, and the great church in one, and Villegagnon flagstaff on with Theodosia battery on point San João; so that its vicinity to Rat island renders precaution necessary in mooring. The best bower, with a good cable, should be laid down to the westward, in order to preserve an open hawse to the entrance; a stream-cable bent on to the small bower-anchor, and taken in at the stern-port, will preserve a free circulation, both from the land and sea-breezes, and the ship's head will thus be directed to the only points of the compass from which the wind can be expected to blow fresh, which are from N.N.W. to S.W.

*Merchants' Road.*—A bar of sand, with some rocks, extends opposite to the city, the outer edge nearly in a direct line from Villegagnon to Rat island, and ending at the N.E. point of Ilha dos Cobras; this bar is passable for boats only, but within it all merchant vessels, that there is room for, discharge and take in

their cargoes; the only passage to it is round the north end of Cobras, near which are the arsenal and Brazilian vessels of war."

Another officer says,—“In entering the harbour take care to pass within hail of fort Santa Cruz, in order to answer any questions that may be asked. There is plenty of water close to the rocks. Then proceed up to fort Villegagnon, below or opposite to which, bring-to, or come to anchor, and allow no boats to come alongside but those of the government, until you have received *pratique*, when you will be permitted to proceed higher up the harbour, round the east end of the isle Cobras, to the place of anchorage for merchant ships.

There are no pilots to be met with off the coast or harbour, for, as there is no hidden danger, they are not requisite. Whilst the sea-breeze is strong enough to enable ships to overcome the ebb, they may safely enter by night or by day; but on entering at night the fort Santa Cruz makes a signal to the city, which is not to be understood as interfering with the vessel entering.

The port regulations require all vessels to bring-to a little below fort Villegagnon; and any one attempting to pass, before she has been visited, will be fired at, and the commander liable to imprisonment, besides paying a fine for each gun so fired." (1820.)

A correspondent of the *Nautical Magazine* for 1842, who signs himself *Mexicano*, has made the following remarks:—

“Approaching the entrance of the harbour of Rio Janeiro, no difficulty is met with, in ascertaining the vessel's position, from the very conspicuous land in the neighbourhood of the harbour. The Sugar-loaf hill, on the left-hand side of the entrance, forms the most conspicuous object, and renders the approach easy, and without danger. The regular winds in the harbour, and for several miles outside, are a land and sea-breeze; the former giving place to the latter, at from 9h. to 11h. a.m.; after this time, therefore, there is generally a fair wind for entering. After passing the Pay and May islands, in the entrance, two forts will be seen, one on the starboard hand in entering, named Santa Cruz; the other, named Laage, is situated on a small island almost immediately opposite. Passing between these two forts, the harbour regulations require the vessel to be carried within hail of Santa Cruz, in order that the master may, in passing, give the name of the vessel, the port from whence she came, and the number of days' passage.

These questions being answered, and passing on upwards towards fort Villegagnon, situated about half-way between the entrance and the city, and on the port hand, it is necessary to shorten sail in time, as the vessel must be anchored previous to coming abreast of the fort, otherwise guns will be fired, for each of which the offenders must pay. While anchored here the vessel will be visited by two boats, one from the fort, the other from the custom-house, which visit being passed, the master may proceed with the vessel to the customary anchorage, above Gobras island (which is easily recognised on the port hand, from the plan on the chart), and then anchor amongst the vessels as soon as possible, and with a short scope of cable, the holding ground being good, and no risk of driving. If the vessel has a stream-chain she will be quite safely moored with one bower and the stream-anchor, which is easily weighed.

There are two ways of discharging cargoes in Rio Janeiro: one by putting the vessel on a list at the custom-house for her turn at the wharf, and the other by discharging in lighters, the vessel paying the lighterage. As regards despatch, from all I could see, the former plan is the best, although far from good.

Generally speaking, a vessel lies in the harbour 10 days previous to being in turn; she may then be hauled alongside a small jetty at the custom-house stores inside Cobras island, and, during fine weather, discharge cargo, being allowed to work, on an average, four hours every day. Only three vessels can discharge at the same time, the jetty only allowing this number to lie alongside. The vessel is moored here with one bower on the stream, the stream-anchor on the off-side quarter, and two on-shore warps; hauling off every day, after discharge, about 10 yards, and hauling in on the morning to within 3 or 4 feet of the wharf.

No custom-house officer remains on board the vessel, neither are any places on board sealed up. A strict watch is, however, kept from several guard-vessels and boats, which latter are constantly rowing about. The shore is also well watched, and the master must be particularly careful, as the fines, imposed for contravention of the custom-laws, are enforced, and the property confiscated. While the vessel has inward cargo on board, and until she has discharged and cleared, no person not belonging to the vessel, can come on board without a written order from the custom-house; neither can any trifling article be removed from the vessel, even for repairs, without a permit. A permit is also required for everything taken on board.

It generally occupies from 14 to 21 days to discharge a vessel of about 300 tons, after she is at the wharf, and when the cargo consists of bales and cases of manufactured goods. I have never in any part of the world, seen a worse regulated custom-house than that at Rio Janeiro; every possible obstruction is put in the way of the vessel's discharge, and every possible inconvenience must be submitted to by the ship-master. He himself should carefully superintend the discharge, and the mate should be most particular in his account, comparing every day, when the discharge is finished, with the landing officers' account. Bales and cases are often said to be missing, although landed. When in stores, even, the merchant cannot find his goods for months, and, in some instances, never succeeds in meeting with them.

The ship-master, previous to leaving England, should not receive coals, iron, or lead, as ballast, if he can avoid it; they are not allowed to be discharged at the wharf, and cause infinite trouble in removing the vessel, &c. Iron, particularly, actually costs more to the vessel to land it than the freight amounts to; an officer must be got and paid, lighters must be hired, and the iron carried through the surf on the beach; then comes the receiver declaring it damaged, &c. Crates and bale goods are the best cargo for despatch: coals as a whole cargo are easily landed, the vessel proceeding at once to a wharf, and discharging from 25 to 30 tons per day.

It is very seldom that return cargoes to Europe can now be procured in Rio Janeiro; even in the coffee season, that commodity is generally shipped in foreign vessels, at low freights; their low prime cost and lessened expenses enabling them to carry cargoes at less freight. Every vessel ought, therefore, to have as much ballast on board, in England, as the broker will allow, or the cargo permit, as it is an expensive item in the vessel's account at Rio. Altogether this is a very expensive place for a vessel discharging a cargo; the anchorage alone amounts to 30 reis per ton per day for 50 days. If the vessel remains longer than 50 days there is no further payment; but if she be cleared, at the custom-house previous to the 50 days, and afterwards detained by foul winds, or other unavoidable circumstances, the additional anchorage must be paid up to the moment of

sailing, before the vessel can pass the forts. It is also said that this tonnage duty is about to be increased. For the calculation of this tonnage duty, every vessel is measured by an officer of customs, according to some rules, which must be peculiar to Rio Janeiro, and suitable to the impoverished state of the finances; as measured by it, the vessel is always made to be a greater number of tons measurement than she can carry tons of dead weight. Another charge, most unjust in its principal, and illiberal in its adjustment, is a duty charged on all provisions on board the vessel, such as beef, pork, flour, bread, &c., beyond a small quantity allowed the crew, according to a scale calculated at a certain number of days from Rio Janeiro to the port for which she clears at the custom-house. Altogether the charges are high, and the detention great, in Rio Janeiro, and every one will do well to take these matters into consideration when chartering a vessel for that port.

In chartering vessels for Rio Janeiro the brokers generally insert in the charter-party, that the vessel must be consigned to their agent, and pay the customary commission. I would recommend every one to erase both these clauses, previous to signing any charter-party, as they are unjust in their principal, and prejudicial to the vessel's interest. Although the British merchants in Rio Janeiro are generally highly respectable, still, when they are perfectly secure of consignments, the vessel's interests are not so well attended to. They always charge a commission on the whole amount of freight inwards, although the greater part of the sum is invariably paid in England, and never passes through their hands at all. This is a manifest overcharge, the only commissions they can in justice demand being on the amount of disbursements and also the amount of freight payable in Rio Janeiro.

Vessels calling for refreshments only, and not discharging cargo, are allowed to enter the harbour without paying port-charges;\* and from the extent of the market, and the facility of filling water from tank-boats, I consider Rio Janeiro decidedly preferable to any port on the coast.

No description of the beauties of the scenery, in the harbour of Rio Janeiro and its vicinity, has, in my opinion, done justice to their merits. In fact, I cannot think any description can convey an adequate idea of this splendid country; I have visited several parts of the world, and seen many specimens of romantic scenery, but none at all come up to the neighbourhood of Rio Janeiro. Every visitor will be much gratified in viewing it, and while the vessel is waiting her turn to discharge, time is afforded the ship-master to make several excursions. Nothing can be finer than the ride to Tsucha, to the waterfalls round the Gabia, and back to the city by the botanical gardens; the latter are well worthy a special visit. The ride alongside the aqueduct which conveys water to the city from the Corcovado, particularly if commenced previous to sunset, affords a view, or series of views, the most magnificent that can be conceived. Every variety of scenery is seen, the city itself is spread out before and underneath you, as in a plain; on one side every variety of hill and dale, mountain and valley, is perceived, covered with the most luxuriant vegetation, and studded, at intervals, with the beautiful country residences of the merchants, with the range of

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\* We are informed that this should read "without paying anchorage dues, but are subject to pay all other port charges, besides the broker's commission and consul's fee."—April 15, 1853.

mountains behind towering towards the sky, on the peaks of the Corcovado and Gabia."

From the entrance to Rio Janeiro the coast has a direction of about W. by S., and after a distance of 20 miles is terminated by a great headland named point Guaratiba: it is here that the range of mountains surrounding the Bay of Rio Janeiro ceases. From this point, in fine weather, Redonda, or Round island may clearly be perceived, although so far distant as 20 miles; it may be distinguished by its form, and also by the streaks of white and dark-green, which slope down on every-side. The mountain La Gabia will also be observed in the E.N.E.; it is a remarkably formed mountain, as already described, and cannot well be confounded with any other; it is therefore the most certain mark for Rio Janeiro, particularly when coming from southward.

## CAPE SAN ROQUE TO MARANHÃO.

**BANKS OFF CAPE SAN ROQUE.**—Cape San Roque having been already described (p. 4), it is unnecessary to add here to our previous remarks. From this part of the coast an extensive flat of comparatively shoal water extends some distance to the north-eastward, and afterwards continues along the coast towards the N.W., as far as point Tubarao, about 70 miles. This flat is known as the banks of cape San Roque, and its outer or northern edge is considered to be in about lat.  $4^{\circ} 50'$  S., which will give a distance from the shore of 12 to 15 miles, —within which it will not be prudent for vessels to approach when making the land.

Off cape San Roque there are four groups of coral banks, awash at low water, and parallel with the coast, at the mean distance of  $3\frac{1}{2}$  miles; small craft can pass over these banks in depths of from 6 to 13 feet.

**Mara-cajahu Reef.**—The most southerly reef, known as Mara-cajahu, trends N.N.W. and S.S.E. for the distance of 4 miles, having a mean breadth of  $1\frac{1}{2}$  miles; its southern extremity is in lat.  $5^{\circ} 26'$  S.,—4 miles N.N.E. from cape San Roque and 3 miles from the nearest part of the coast; its north extremity is 3 miles E.N.E. from point Pititinga, a high sandhill easily recognised by a large clump of trees on its summit: proceeding from this reef seaward the depth increases from 5 fathoms to 14 and 16 fathoms at the distance of 10 miles.

**Fogo Reef.**—The channel between the Mara-cajahu and Fogo reefs is 6 miles wide, and is easily accessible for small vessels. The south extremity of the latter reef is in lat.  $5^{\circ} 16'$  S.,—and is 4 miles from the nearest part of the coast; the north extremity is 3 miles from point Gamelleira, another large sandhill on which are two clumps of vegetation and a dead tree that can be readily distinguished. This reef is  $4\frac{1}{2}$  miles long and 1 mile wide.

The next reef to the northward may be considered as part of the Fogo reef, since the channel between them is only 110 yards wide, and the depth varies from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  fathoms: this reef is 2 miles long.

**Sloba Reef.**—This reef is situated 5 miles N.W. of the last-mentioned reef; it extends  $2\frac{1}{2}$  miles N.W. and S.E., having a width of about half a mile; its centre is in lat.  $5^{\circ} 7\frac{1}{2}'$  S.,—3 miles N.E. of point Calcanha, whence the coast of Brazil is deflected abruptly to the westward.

Small detached banks, on which the depth does not exceed 9 or 10 feet, also exist in the channel to the south-eastward of the Sioba reef.

Seaward of the Sioba (northernmost) reef, the depths do not increase regularly as in the vicinity of the other reefs; a long and narrow bank, connected with the south end of the Sioba reef, runs in one direction to the North and then to the N.W., while in another direction from the same end of the reef it trends to the S.E.; this bank extends N.W. and S.E. for a distance of 10 miles, with depths varying from  $3\frac{1}{2}$  to 5 fathoms, and has on it one spot not exceeding 3 fathoms. The south point of this bank is in lat.  $5^{\circ} 11' S.$ ; its north point in lat.  $5^{\circ} 4\frac{1}{2}' S.$ , and 5 miles north of point Calcanha.

All these reefs break at low water, or with a fresh breeze from S.E.: but with East and N.E. winds, which are always moderate along this coast, there is no break on any of the reefs at high water, on which account they are the more dangerous; sighting the coast by day and sounding at night afford ready means of avoiding them. The depths decrease with tolerable regularity on approaching the reefs; there are 16 to 22 fathoms, from 8 to 10 miles off; 11 fathoms, from 4 to 5 miles off; and 4 to  $6\frac{1}{2}$  fathoms, near the reefs.

The coast, formed of long and detached sandhills surmounted here and there with clumps of vegetation, is visible from 12 to 15 miles from the deck of an ordinary ship; consequently the land can be seen some time before the edge of the bank is reached.

At a short distance from the coast, the currents (in November, December, and January) are scarcely perceptible; they follow the direction of the winds and unite with the tidal currents in the channels. At the same period of the year the winds are moderate and blow constantly from E.S.E. to E.N.E.; the weather is very fine, and the sea smooth, south of cape San Roque,—but having doubled the cape to the westward, the East winds of the season are very fresh, and a heavy sea rolls over the reefs of Urca and Lavadeiras, as also along the entire coast to Ceara and Maranhao.

Brazilian coasters and small steamers invariably use the channels among the reefs even with contrary winds; they prefer beating within the reefs, where they have the advantage of a smooth sea, variable winds, a favourable current and good anchorage. In the channels the depths vary from  $14\frac{1}{2}$  to  $26\frac{1}{2}$  feet.

Lieut. S. P. Lee, of the United States Navy, spent three days, in 1852, within 20 to 30 miles northward of the banks of cape San Roque. He says,—“Our position was off cape Toiro, where the S.E. and N.E. trades seem to meet and form a region of calms and rains, with an oppressive atmosphere, resembling that of the equatorial calms. Outside of this region the S.E. trades, though light, generally prevailed between the Roccas and the main, to within a degree of point Toiro, and when we were  $1\frac{1}{2}^{\circ}$  north of this cape, and in the parallel of the Roccas, the light variable winds, leaving the S.E. quadrant, came out to the eastward, soon got northing in them, and turned into gentle N.E. trades  $2^{\circ}$  in S. The direction of the winds around this cape, outside of the influence of the land-breeze, and also outside of the belt of calms and rains, appears to be modified by the form of the continent. They come from the southward and eastward upon the eastern shore, which trends to the northward; whilst around the elbow of the cape they draw more easterly (interrupted at this season, when the sun is near the equinox and is going north, by small squalls of wind and rain from all around the compass), and on the northern coast, which trends to the westward, they come from the N.E.

The current between the Rocas and the main sets generally from the southward and eastward, from 1 to 1½ knots, until near the banks of cape San Roque, where we experienced indications of a counter current or tide.

We learnt at Para that the coasting vessels are generally four weeks going thence to Pernambuco. It is more from the failing of the wind than from the current that it is so difficult to double cape San Roque."

**THE COAST.**—The coast westward from the banks of San Roque, presents but few points sufficiently prominent to be distinguished at a distance of 2 or 3 leagues, which will be quite as near as a large ship ought to go. In general the shore is very low, and composed of white sandy downs of almost uniform colour and configuration, which are too much alike to form conspicuous marks. The coast trends westward from point Touro for about 70 miles, and then curves north-westerly 140 miles to point Mocoípe, the eastern point of the bay of Ceará; off it there are soundings, which extend outward 7 or 8 leagues. It is said that there is but little difficulty in navigating this part of the coast, if ordinary care and attention be exercised; it will, however, be prudent to keep a good look-out from the mast-head, and make a frequent use of the lead.

At 26½ miles north-west from point Touro and 12½ miles from shore is a dangerous reef known as the Urca do Cotia, westward of which are numerous other reefs extending 12 to 15 miles from shore. The principal of these are known respectively as the Coroa das Lavadeiras, the Urca da Conceicao, the Urca do Minhoto, and the Tubarao reef. The last-named reef lies off Tubarao point, distant from it about 12 miles.

From the Morro of Tubarao the coast runs westward about 80 miles to point Do Mel, the shore between bending inwards and forming a sort of bay, into which the rivers Amargoso, Dos Cavallos, and Dos Conchas fall; it afterwards continues a further distance of 20 miles to the Morro Tibao, and in this intermediate space receives the river Mossoro. These rivers are believed not to have very swift currents, except, perhaps, in the rainy season, at which time great quantities of water fall upon the high lands in the interior; it is also thought that they are not navigable by other vessels than the small coasters.

Mel point, the extremity of a down, more elevated than the land which surrounds it, terminates in a steep shore to the northward, and its summit appears green and woody. When bearing southward, it presents a great bluff, or head, and ends in a point to the eastward and westward. Its northern point is immersed in a mass of land, and its eastern point is a little sharper than that opposite. The depths about it decrease. A large vessel should not approach within 3 leagues of it, there being at the distance of 4 miles only 20 feet water. At about 7 miles westward of Mel point is Redonda point.

**João da Cunha.**—A group (13 in number) of dangerous rocks, about 1½ miles in extent, with 14 to 17 fathoms water close to them, lies 10½ miles from Redonda point; their northern edge is in lat. 4° 44' S. They were seen in 1830 by a merchant vessel, named *Angerstein*, are of dark brown colour, and occasionally uncover.

Coasting vessels load salt to the little river Mossoro. All the shore in the vicinity of this river is so low, that when at the distance of 3 leagues, vessels will be able to distinguish only a few detached parts of the land, which is alternately composed of white sand and little steep cliffs strewed with clusters of bushes.

The Morro Tibao, a little hill of red sand, slopes down to the sea, and is rendered very remarkable by its colour. It is situated about 20 miles S. 42° E.

from point Reteiro Grande, in lat.  $4^{\circ} 49' 20''$  S., long.  $37^{\circ} 18' 0''$  W. About 22 miles N.  $52'$  W. from Reteiro Grande, is point Aracati, situated to the eastward of the meridian of a little mountain of the same name.

In going westward from Reteiro Grande, the downs, of which the coast is formed, rise a little more from the edge of the sea than in the preceding part of the coast; but their barrenness becomes more visible, and the clusters of bushes more rare. It is between two groups of hillocks which slope down to the margin of the sea, that the entrance to the river Aracati or Jaguarybe will be perceived. A square building, having the appearance of a barrack, stands on the summit of a sandy down to the westward of the river, and may serve for a mark in approaching from sea.

**RIO ARACATI, or JAGUARYBE.**—This is the first port of consequence in northern Brazil, met with in running down the coast from the eastward. It is a large river, in parts sufficiently deep to accommodate vessels of considerable size, but it labours under the disadvantage of a shallow bar at the entrance, which effectually prevents vessels that could ride inside from entering. This bar is a *shifting* one, and has usually a very heavy surf breaking upon it, so that it is by no means easy to cross, besides which the narrowness of the channel adds to the difficulty of the navigation. When the bar is crossed, the channel up the river widens, and for the space of about a mile forms a sort of basin, in which, in 1829, the time of the survey, there was a depth of 6 to 15 feet. The northern point of the river is estimated to be in lat.  $4^{\circ} 23' 30''$  S., long.  $37^{\circ} 43' 50''$  W.

According to Pimentel, the old Portuguese hydrographer, the entrance to the river may be recognised by a round bare hill of sand on the N.W., which terminates in a rock below. He also says that inland there is a mountain having seven points in the form of a sugar-loaf.

The town of Aracati stands on the south bank of the river, at the distance of about 11 miles from the entrance, and is a place of considerable trade. It consists chiefly of one long street, extending East and West, with several minor ones branching to the southward. Thus far the river is influenced by the tide. At the ebb the stream is fordable, and as it spreads considerably from the main channel, some parts remain quite dry at low water. The houses of Aracati unlike those of any of the villages in the vicinity, have one story above the ground floor, and this, because the floods are sometimes so great as to render it necessary to retreat occasionally to the upper part. There are three churches, a town hall, a prison, but no monasteries. The inhabitants are in number about 600. (1816.)\*

In consequence of the difficulty experienced in entering the river, and the uncertain depth of water on the shifting bar, few vessels other than the native coasters visit the port, although there is a considerable commerce in the produce of the surrounding country carried on at Aracati. At times the entrance is nearly choked up; and Mr. Koster mentions that in 1815, a little before his visit to the

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\* "The town of Aracati is situated on a picturesque river, but with a very bad bar entrance, on which several vessels have been lost; it is, therefore, usual now to load outside, some miles higher up the coast, where an indent admits of shelter, and to which the cotton is taken in jangadas. Though the heat in this province is excessive in summer, the climate is nevertheless healthy. Its population is somewhat about 200,000; and gold, as well as copper, iron, and salt, is among its yet very imperfectly ascertained mineral resources." (*Hadfield's Brazil*, 1854.)

town, the bar was completely dry, while there were two coasters in the river taking in cargoes for Pernambuco.\*

The following remarks, on the river and its approaches, were written by Mr. Dixon in 1832. It appears from his survey that it is high water here on the days of full and change of the moon at 5h. 30m.; springs rise 8 feet, and neaps 4 feet.

"As vessels frequently engage at Pernambuco, on the eastern coast, to load a cargo, or part of a cargo, at Aracati, they consequently proceed, in the first instance, to the N.N.E., and then North, until they have passed cape San Roque, and the parallel of the extensive flats, on the north coast, bearing the same name. The latitude of the Urcas, the most dangerous reef on these flats, is  $4^{\circ} 50'$  S., in the longitude of  $36^{\circ} 18'$  W. Having passed these shoals, by running westward, in latitude  $4^{\circ} 40'$ , or thereabout; on approaching near enough to the shore, point Do Mel will be seen, composed of red cliffs and low white spots of sand on each side of them. This point must be avoided, for when it bore about S.S.E., at the distance of 7 miles, we were on a shallow bank of 17 feet, and farther to leeward the water appeared white, and, without doubt, was shallower. Running along the shore north-westward, and keeping in about 6 fathoms, point Reteiro Pequeno, formerly known as cape Corso, will be seen, and also a mountain, appearing *blue*, in the interior; the former appears red, being a large bank of red sand, and the latter resembles Bardsey island in St. George's channel. When these two objects are in one, the Reteiro Grande, or Algeberana head, will be distinctly seen. The land to the south-eastward of this head for 3 or 4 miles has a very singular appearance, forming like two steps, the lower part being reddish, and the other gray. The head itself is rugged, and has a pinnacle close to its base, which, when bearing W. by S. will appear open.

At the distance of about a mile there are several rocks, of which the outermost is covered at high water; it is necessary, therefore, to give this head a good berth, until a large lump or hill, situated on the south-west side of Reteiro bay, is brought to bear S.W.; then steer toward the hill until Reteiro head bears E.S.E. With these bearings there is safe anchorage in 3 fathoms water; or, if the vessel's draught will admit, you may go further in, and find smooth water, as the rocks off the head break off much of the sea.

Here vessels bound to Aracati generally lie at anchor, while the master proceeds thither overland to inform his consignee of his arrival, draught of water, &c. There is a house at the bottom of the bay for the accommodation of travellers, and farther up the valley are some others, where a horse and guide may be procured. The distance from this place to Aracati is about 21 miles, and a great part of the way is along the sea-shore. The course from this anchorage to the bar of the Jaguarybe is about N.W.  $\frac{1}{4}$  N., 20 miles.

The land in the vicinity of the bar is very barren: on the north side of the entrance there is a high red bluff, and also two rocks close to the water's edge; one of these has the appearance of a large gun, with a small fort and flagstaff, and some huts close to it. These objects, together with a spit of sand on the

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\* Mr. Koster has observed,—"Even if no other obstacle than the bar presented itself, the port cannot, from the uncertainty of the depth of its entrance, ever become of importance. Coasters alone can enter; and I understand that the sand in the river also accumulates; the sand-banks project from each side, in some places so much as to render the navigation, even for a boat, somewhat difficult from a short distance above the bay."

S.E. side, the breakers across the mouth of the river, and the smoothness of water within them, are good marks by which the entrance may be readily known.

In proceeding toward the bar a low spit of sand will be observed, which forms the S.E. side of the entrance of the river, and a ridge of heavy breakers, parallel to the shore for 2 or 3 miles, without any appearance of a passage. We approached them in our boat, and perceiving a buoy, we soon got within the breakers, where we ascertained that this was not the channel used by the pilots, although there were 6 feet of water in it at low water. The best channel is farther to the N.W., for, besides having 3 feet at low water, it affords an easier passage out, as it lies in a N.E. and S.W. direction; whereas the former lies nearly E.N.E. and W.S.W., and is very narrow.

Both of these channels are liable to shift, and, therefore, every master ought to make himself acquainted with the state of the bar before he attempts to enter. Buoys or boats may be readily placed in the channel, or perches may be fixed on the spits, or on shore. He should also know the time of high water, and take the bar half an hour earlier. After passing the boat or buoy that should be moored in the deepest water between the breakers, it will be necessary to haul up S.S.E. or South, to clear a bank on the west side, that nearly dries at low water. On this bank, as well as on that to the north-eastward of it, perches ought to be fixed. So soon as this bank is cleared, the depth will increase, and a westerly course must be taken, in order to pass between the high sandy beach on the starboard, and a low bank that dries at two hours ebb, on the port hand. This channel, not a furlong in width, is by the pilots generally called the Funnel; and there are usually ten or twelve perches along the edge of the low bank. Having passed this narrow channel, it is proper to haul to the southward, to get under the sandy point on the south side of the river, into smooth water. In advancing towards O'Neil's bank, which must be approached with caution, keep the lead going, and tack in good time, in order to get close to the weather shore. The channel between this bank and the shore is deep and narrow, but, after passing it, there is good anchorage in  $3\frac{1}{2}$  or 4 fathoms, where vessels generally anchor when waiting for a wind or tide to go out.

A vessel whose draught of water does not exceed 10 feet (and it would be imprudent to be much deeper for passing the bar) may sail up it at two hours' flood, to Cook's anchorage, where vessels generally load; and by waiting for more of flood she may go  $2\frac{1}{2}$  miles still further up, and take in a cargo safely.

Sailing out of this port is more dangerous than coming in, as the wind is only favourable for passing the bar during three hours in the morning, and even then it cannot be depended upon. Should it fail, or head in the least, the vessel would be in imminent danger, as a heavy sea is always running on the bar; and the channel is so narrow that anchoring would be useless. When a vessel has been conducted through the Funnel, and as far down as the lowest perch, and being on the starboard tack, as much canvas should be set as she can carry, in order to give her good way over the shallowest part and through the breakers.

No vessel should attempt to go out if it has been blowing hard the day before, as a heavy sea will then be on the bar, and probably the breeze not regular.

According to the pilots and inhabitants of the place the channels often shift: the banks being composed of quicksands, the river, when swollen with rains, forces its way through them in various directions, and sometimes forms new channels, so that there is no certainty of their being long in one position. It is

also affirmed that the channel is seldom deep enough till after the river has been raised by continual rain; so that in the dry season vessels are detained for months for want of sufficient water."

The *Current* off this part of the coast appears to have an uncertain strength, although its direction towards the N.W. appears to have been pretty well ascertained. Baron Roussin says,—“We did not find the current on this part of the coast to run more than six-tenths of a mile per hour; its tendency is always to the N.W., that is to say, nearly in the direction of the coast; but its velocity was much less than many descriptions have formerly indicated. We are, however, far from concluding that such descriptions are erroneous, as they were computed, for the most part, in the season opposite to that of our observations; and it is not unreasonable to suppose, that during the southern monsoon the winds may propel the waters to the N.W. with that force which has been stated.” Among others, Captain Hewitt is said to have experienced a current running 47 miles W.N.W. in 24 hours, in the month of April; and a current of this strength has been observed by the native pilots, who say that, from the month of January to June, the currents run with rapidity to the W.N.W., but they also add, that this never happens except after a high and long-continued wind.

From the Rio Aracati the coast runs to the N.W. about 60 miles to Ceara, and is of moderate height, and bordered by a reef of coral rock similar to that which lines the coast about Pernambuco. This reef, with frequent breaks, continues along the shore about 60 miles beyond Ceara to the north-westward, and within this extent the land is moderately elevated, but decreases in height as thence towards Maranhão, being succeeded by a low sandy shore, with sand-downs many of which are but little above the surface of the sea. The soundings, as they generally are off such coasts, are mostly regular, decreasing gradually toward the shore from a distance of 15 or 12 miles.

In the interior of the country about Ceara are many lofty hills of an agreeable aspect, which are visible at a considerable distance, and will be readily distinguished when running along the coast from the eastward. The Serras de Ceara, in long.  $38^{\circ} 46'$ , are a group of mountains which, seen from the sea, appear to run from the S.S.E. to the N.N.W.; these are situated behind the town of Ceara, which stands upon the shore. The two Morros of Caravelas and Canavieiras, to the eastward of these mountains, are the first that break the uniformity of the large range of sand-hills lining the coast all the way from cape San Roque.

The mountains of Ceara are visible in fine weather at the distance of 15 leagues, but they are situated some distance from the sea, and are not therefore always to be seen at this distance. The peak of Massaranguape is one of the most conspicuous of these mountains, and is a valuable landmark for the port of Ceara, especially when approaching from the eastward; it is estimated to be in about lat.  $3^{\circ} 53' S.$ , and long.  $38^{\circ} 43' W.$  so that its position is nearly 15 miles S.W.  $\frac{1}{4}$  W. (*true*) from the town.

From point Massaio, the north point of Aracati river, the coast trends N.W. by N. 40 miles to cape Iguape which is visible about 23 miles from seaward. Several rivers disembogue between these headlands, but none are of importance to navigators.

“Iguape bay” says Pimentel “forms a small harbour, surrounded by very high perpendicular cliffs against which the sea breaks at half-tides. It has a high round rock, behind or within which is shelter and anchorage in  $2\frac{1}{4}$  or 3 fathoms. On the N.W. of this bluff rock, vessels may anchor in the very roll of the sea,

as it has 4 or 5 fathoms; and they may find on the strand pits already made for watering. Alongside of this rock of Iguape, to the East, the Rio Xaro falls into the sea, and, on its west side, 3 leagues out at sea, there is a shallow spot of green water, of 5, 6, and 7 fathoms, the soundings on which are a mixture of fine and coarse sand, and, in some places, small shells. From the mouth of the Jaguarybe, to the rock of Iguape, is about 10 leagues, and the coast runs W.N.W. Ten leagues farther on, to the W. by N. there is another full bluff point, named Macoripe, beyond which is the settlement of Ceara."

**Macoripe Light.**—Upon point Macoripe is a lighthouse which shows a revolving white light, at 85 feet above the sea. The light attains its greatest brilliancy once every minute and is visible 12 miles. The tower is 50 feet high, and its geographical position is lat.  $3^{\circ} 42' 5''$  S., long.  $38^{\circ} 27' 31''$  W.

**CEARA.**—Ceara or Seara is a town of considerable importance, being the only port on the north coast of Brazil, with the exception of Maranhao, that can be visited by large foreign vessels. The bay is formed on the eastern side by point Macoripe, and presents to the eye a regular and beautiful curve, sweeping inwards in the form of a semicircle. It is, however, quite open to the north, and there is little if any protection to vessels should the wind blow strongly from that quarter. The exposure is from N.W. round by north to East, a direction from which the winds are most prevalent; the ground is, however, said to hold well to some distance from the coast, so that there is but little danger of remaining while the weather is moderate.

Point Macoripe is an abrupt sandy bluff, and appears when viewed from eastward, like the extremity of a sandy down, rather elevated. It has, or had, a few trees upon it, and also a house and signal-post, besides which there is a barrack or guardhouse, on the flat ground towards the N.N.E. When running for the bay from the N.E., it is advisable not to approach the point nearer than 2 miles, and a berth for anchorage should be chosen outside the points forming the bay. The point is surrounded by a reef which extends from it some distance. Immediately westward of the point, and distant one mile from the lighthouse, is the village of Macoripe.

It is said that some difficulty is frequently experienced in making the port of Ceara, not so much perhaps from the absence of landmarks as from the occasional inability of perceiving the mountains in its rear. A thick haze constantly hangs over the land during the period of the strong winds, and prevents the low sandy coast from being seen at a distance, although the sky overhead may be perfectly clear. It is, consequently, not at all uncommon for strangers to the navigation of the coast, to make fatal mistakes by running too near the shore, being deceived by these mists. This peculiarity obtained for large tracks of the coast the name of "*lençois*" (white sheets), or "*sheeted sands*," from the early Portuguese navigators.

*Strangers bound to Ceara ought to obtain a pilot.* Sailing vessels should stand close in to Macoripe and if a pilot does not come off at once anchor in 5 or 6 fathoms; many vessels have been swept to leeward by the current through making too long tacks off the port. In the absence of a pilot, the following remarks may be of service:—

Abreast the town, and at a short distance from it, there are some dangerous ridges of rock more or less even with the surface of the water. Within these ridges is the usual anchoring place, but it is not an anchorage that is much

recommended, on account of the heavy swell that is sent in when the wind is on shore.\*

The outermost reef is that known as the Pedra da Velha (Old Woman's rock). It is extremely dangerous, as close to its edge there are 4 fathoms, and little, if any, warning of its vicinity is given by the lead, so that it requires the utmost care to avoid; its situation is, however, generally indicated by breakers. It is about a quarter of a mile in extent, north and south, and its bearing and distance from the fortress at Ceara are N.  $\frac{1}{2}$  E.  $1\frac{1}{4}$  miles.†

Within the Velha reef and about half way between it and the shore, there is another reef equally dangerous, known as the Great reef. It runs parallel to the coast for about three-quarters of a mile, and is, we believe, visible at low tide. Its eastern extremity lies about half a mile N.N.E. from the fort of Ceara and forms with the Porto reef, which runs out from the coast, the eastern entrance to the port,—a channel  $1\frac{1}{2}$  cables wide. There is also a rocky bank in the middle of the port, between the Great reef and the coast, at about 4 cables North from the fortress.

Eastward of the above reefs there are two others, named Estrella and Meirelles. The former runs out from the coast about half a mile, but the latter consists of two detached dangers; one of which is a quarter of a mile long, in a direction parallel to the land, the other, more to the eastward, is about a cable in extent and distant from shore about three-quarters of a mile. Close to the Meirelles reef there is a depth of 4 fathoms at low water.

The anchorage is between the Great reef and the shore, in a depth of 3 to  $3\frac{1}{2}$  fathoms. It is usual to enter from eastward, passing close to the Great reef, and keeping a sharp look-out for the rocky patches; it is also prudent to have the lead going. When leaving the anchorage it is most convenient to pass west of the Great reef; indeed, this is the route commonly adopted.

Between the Meirelles reef and point Macoripe, there is good anchorage in  $3\frac{1}{2}$  to 4 fathoms, but its exposure to the on-shore winds makes it by no means a desirable place to ride in when these come on to blow.

Notwithstanding the inconvenience of Ceara as an anchorage, and its difficulty of access in stormy weather, as well as the little shelter that is afforded within the

\* Upon this part of the coast the reef runs lower than towards Pernambuco, which has obliged the people of Ceara to take advantage of the rocks being rather higher here, and affording some little protection to ships at anchor. The spot seems to have been preferred owing to this advantage, trifling as it is, though the rocks are much inferior to those which form the bold reef of Pernambuco. (*Mr. Koster.*)

† The Pedra da Velha should have a good berth given to it, there being no mark to indicate its position. In 1824 a vessel drawing only 9 feet water, commanded by a Captain Matthewson, was unfortunately lost upon it. From the Captain's account it was situated about one-third the distance between point Mocoripe and the inner anchorage, and appeared to be about three times the length of his vessel, with a depth all round it of  $3\frac{1}{2}$  fathoms. In going into the bay, the lead was kept constantly going, and when in  $3\frac{1}{2}$  fathoms, the master wore ship with her head off the shore. "The moment before she struck, we had," he says, " $3\frac{1}{2}$  fathoms water; she struck twice, but did not stop; and as quick as the lead could be hove, we had  $3\frac{1}{2}$  fathoms again." The rock may be seen at low water; but in the day-time, when the sea-breeze sets in, the water generally covers it, so that it is not easy to distinguish its situation in the general swell.

reefs, it is rapidly becoming a port of importance, and perhaps there is no place on the north coast of Brazil, Maranhao and Para excepted, whose foreign commerce has increased so much during the last few years.

Baron Roussin says,—“ In the outer roadstead, at one to 3 miles from land, there are from 6 to 10 fathoms of water; bottom of soft sandstone covered with sandy ooze, and in which the anchor holds well. The pilots told me that the coasters enter the inner road by two passes formed in the reef, at 200 toises asunder; the depth in these passes is about 13 feet at high water.”

The town of Ceara is built in the form of a square. The streets are well laid out crossing at right angles; they are well paved and lighted, and the town generally is remarkably clean and healthy. Railways into the interior of the country are in course of construction. Freshwater is abundant, but dear; provisions are moderate.

The inhabitants number about 3,600. The fort, from which the place derives its name, stands upon a sandhill close to the town, and consists of a sand or earth rampart toward the sea, and of stakes driven into the ground on the land side. It has about half a dozen ill-arranged guns. The powder magazine is situated upon another part of the sand hill, in full view of the harbour. There is not much to invite the preference given to this spot: it has no river, nor any harbour, and the beach is bad to land upon; the breakers are violent, and the reef, or reef, affords very little protection to vessels riding at anchor within it. The settlement was formerly situated three leagues more to the north-westward, upon a narrow creek, where there now exists only the ruins of an old fort. The beach is steep, which renders the surf dangerous for a boat to pass through in making for the shore, and landing is particularly inconvenient. The anchoring ground is bad and exposed; the winds are always from the southward and eastward, and if they were very variable, a vessel could scarcely ride upon the coast (1816).\*

Mr. Kidder says, 1845,—“ The landmarks of Ceara are the slight promontory of Macoripe on the south, and the mountain peaks of Massaranguape, which lie some distance inland from the city. These mark the termination of the great Serra do Mar, which stretches through at least 20° of latitude, sometimes bordering directly upon the ocean, at others extending far inland. The town is frequently denominated Fortaleza, after an ancient fortress built upon the shore to defend the harbour. The harbour was never very good, and is now deteriorated, through the constant influx of sand. At the time of our arrival, a few coasting smacks and an English brig were all the vessels in port. The landing is nowhere good, on account of the heavy surf that continually breaks upon the strand.

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\* Ceara is situated in a very sandy district, but with a good back country, where many cattle are bred, but which suffers much from occasional drought. It exports a fair quantity of hides, some cotton and fustic. There is no harbour or protection beyond a reef of rocks that forms a kind of breakwater, within which vessels can ride at anchor. It is a curious thing that the reef, of which this constitutes a part, extends along nearly the whole coast of Brazil, from cape San Roque to the Abrolhos near Rio Janeiro, and is of the same hard coral nature. In many places an entrance through, or a break in the reef, enables vessels to get to small ports inside, and jangadas can sail along the coast within these reefs for hundreds of miles, entirely protected from the sea, which rolls in and breaks upon them with a deafening noise. (*Hadfield's Brazil.*)

Adapted to this, the pilot-boat in which I went on shore was guarded by strong outriggers to prevent capsizing, but even then did not willingly come in contact with the shore. After conveying passengers from the shore to a fordable depth, we were landed in a *paviola*, a kind of chair elevated on poles, and carried by four men."

The following remarks are by Lieutenant D'Elissalde, of the French marine, when in command of the gun-brig *La Vigie*, 1848 :—

"At the anchorage of *La Vigie* we found the depth to be 19 feet at low water, to 28 or 30 feet at high water, which gives a mean depth of 25 feet, nearly. It is necessary to moor and run out 20 fathoms of chain to each anchor, and the holding-ground is so good that a vessel never drives.

The road is open from W.N.W. by north to East, so that it is exposed to all the most dangerous winds, the land or southern breezes being always very weak. The reefs break off the sea, but there is always some motion of the ship, because the swell comes constantly from the N.E. Landing is very difficult, for the sea breaks with great violence on the sandy shore, and it becomes impossible at high water, under risk of injuring the boats. It is advisable at low water to fix a grapnel off-shore, so as to be able always to keep the boats to the swell.

Watering is difficult, the boats keeping some distance off, so that it is very troublesome to get large casks on board at low water, and impossible at other times. The inhabitants procure water by digging a few feet in the sand, but the quantity gained in this manner is very insufficient. Every ship therefore freighted with cattle should be prepared accordingly, as I believe it is impossible to procure the necessary quantity for this service at Ceara. According to our pilot, there is a watering-place at the anchorage of Macoripe, where watering is easy.

The fort at Ceara has never been finished. There are only the curtain and the two bastions toward the road, and its armament of eighteen pieces of cannon is much more formidable to their own artillerymen than to those against whom they may be directed. The town is completely open and unprotected.

The breeze is commonly weak and irregular; it freshens nevertheless in the afternoon, and deadens in the evening."

It is high water on the days of full and change at 5h. 35m. The rise of tides is uncertain.

**Curu, &c.**—From point Macoripe the coast trends about N.W.  $\frac{1}{4}$  W. 57 miles, or as far as the meridian of Monte Melancia, a down of isolated sand standing upon the sea-shore. In sailing along, vessels will pass successively the outlets of the rivers Ceara, Cauipe, Pessem, Pericuara, San Gonçalo,\* Curu, Trairi; also the Morro de Curu, and the Serras de Mandahu, known by the pilots as the Serras Grandes. The whole coast is barren, exhibiting little trace of cultivation or habitation; it is merely a continuation of low sandy downs and quick-sands, without any diversity. The coast is considered safe at 2 or 3 miles to seaward, as at that distance the depth is 6 to 13 fathoms water.

Curu is a small village, in lat.  $3^{\circ} 21'$  S. and long.  $39^{\circ} 7' 20''$  W. When visited by H.M.S. *Sapphire*, in 1833, it was after a run along the coast from Ceara steering first N.W.  $\frac{1}{4}$  W, and afterwards N.W. The distance maintained from the land was not more than 4 miles, and the depth 13 to 11 fathoms. "When abreast it," says Captain Wellesley, "the decrease of soundings to 9 and 7

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\* A lightvessel exhibiting a *fixed white light* is stationed off the entrance of Gonçalo river.

fathoms warned me off. There is a heavy breaking shoal extending from the point on which this village stands; and, in case any one not knowing his longitude should make it, it may not be amiss to state that we saw catamarans, with their sails hoisted to dry on the beach, which had exactly the appearance of large boats sailing upon a river, until the regularity of their distance and a nearer approach, dispelled the illusion. As we hauled out from Curú the water did not deepen for a considerable time, and I believe we were on the eastern extremity of the shoal which surrounds point Jericoacoara."

From Monte or mount Melancia the coast runs about N.W. by W. 43 miles to point Tapage; and afterwards due West about 30 miles to Jericoacoara point, where it curves a little southward, forming a small bay; thence the coast trends westward for about 70 miles to the Barra Iguarucu, the eastern entrance to the Parahyba.

The appearance of this coast is the same as that which precedes it, being a flat sandy shore, very low, and destitute of verdure, except that here and there a few cocoa trees may be seen upon the downs along the shore.

**Almufedas.**—The village of Almufedas stands at the back of the downs on the banks of the Rio Aracati Merim, which is navigable by coasting vessels. Its steeple may be perceived from seaward, standing amidst cocoa trees; it is in latitude  $2^{\circ} 57' 30''$  S. and longitude  $39^{\circ} 51' W.$ , and is serviceable as a mark for the eastern edge of a bank which stretches along the coast almost as far as the little hamlet of Jericoacoara, a village situated about 14 leagues West a few degrees northerly from Almufedas. This bank is named by the natives the Paracel de Acaracu, after the most considerable hamlet on the coast; it extends about  $3\frac{1}{2}$  leagues from the shore, and has on its edge a depth of 6 fathoms. From the depth of 6 fathoms the soundings gradually decrease to the shore.

This part of the coast ought not to be approached in large vessels nearer than 12 miles, that is to say, to just within sight of the land, for its height is so moderate that at that distance only the tops of the cocoa trees will be visible even in the clearest weather. When about 8 miles off-shore, on the meridian of Acaracu, or  $40^{\circ} 8' 10'' W.$ , and wishing to continue a westerly course vessels may begin to turn a little towards the land, so as to be able to distinguish some houses forming the hamlet of Castlehanos; but this can be of no utility to large vessels, because those drawing more than 15 feet water must not approach this part of the coast nearer than 10 miles, until they get to the westward of the down of Jericoacoara, nor go into less water than 7 or 6 fathoms.

When to the westward of Jericoacoara, the soundings will determine the distance to which a vessel may approach the cove. There are no dangers to be feared, and 4 fathoms water will be found at the distance of half a mile from the cove of Jericoacoara.

**Jericoacoara.**—This cove is formed by the reef of rocks with which the shore is bordered. The entrance to the port is only a narrow opening in the rocks, and not navigable for even canoes, except at high water, on account of its small depth, and because the waves often beat very high; but when vessels are within it they will find smooth water between the reef and the shore. The hamlet consists of only a small number of houses, occupied by the Sertanejos (inhabitants of the desert); their houses are formed of a few poles stuck into the ground at one extremity, and united at the other, that side where the wind comes from being covered with cow-skin. They appear only to be inhabited at certain times, such as when the

coasting vessels come to purchase hides, which are obtained from the numerous cattle frequenting these parts.

At Jericoacoara provisions and cattle may be obtained in great numbers, and at a moderate price; it is necessary, however, to give the natives time to catch the beasts, and conduct them to the shore. No vegetables can be obtained here, and fish are not very abundant. The inhabitants only fish on the shore, and content themselves with those which are left by the sea among the rocks when it retires. Water, of perhaps indifferent quality, may be obtained by digging pits in the low grounds.

From Jericoacoara the coast to the westward consists of a low shore of white sand, having clumps of small bushes in the interior. Along it is the reef of which mention has so frequently been made. In sailing at 1 to 4 miles from the land vessels will find 4 to 8 fathoms water, on a bottom of ooze, sand, and madre-pore or coralline substances.

At 15 miles westward from Jericoacoara cove is point Feijão, a wooded headland, visible 18 miles; reefs extend off this point in a north-westerly direction, about 2 or 3 miles. At about 6 miles westward from this point is the entrance and bar of the river Camocim, on the west bank of which is a village of the same name. In sailing thence westward the entrances of the rivers Tapuio, Timonha, Ubatuba, Camaropim, will be passed in succession, all which are obstructed by bars and only fit for boats.

**RIO PERNAMBÃO, or PARANAHYBA, &c.\***—The river Paranahyba is one

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\* The Rio Pernambuco is formed by three streams of the same name, that take their rise in the borders of the Sierra, which bounds the province of Piahy on the S.W. The first tributary is the Rio Bolsas, the only one, in fact, that joins it on the left bank. Near this confluence the Rio Urussaty enters it on the right bank, and comes down from the same Sierra. At 28 leagues lower down the Gorguea, having taken its rise in the Sierra of the same name, and formed in the early part of its course the lake Pernagoa, is incorporated with it. At 36 leagues farther, it receives the Caninde, which flows from the Sierra dos Irmaes to the S.E., and at 6 more the Poty falls into it. After 44 leagues of its course the Rio Longa joins it; at a little below which a small arm issues from the Pernambuco to the east, and forms a large lake called Encantada, the island between it and the river being about 5 miles in length. At seven leagues farther down, this river divides itself into two rather unequal streams, and ultimately enters the ocean by six branches, separated by the five islands above mentioned. The distance of the Barra de Iguaraçu to the Villa de Pernambuco is about 8 miles.

By means of the Rio Pernambuco a communication might be opened with the Rio Tocantins, and a much shorter outlet obtained than by the navigation of that river into the Amazon, or the overland route to Rio Janeiro, for the valuable productions of the rich province of Goyaz.

Pimentel says of the river and coast in its vicinity,—"At the distance of about 1½ leagues beyond the Iguaraçu there is a rocky point, and seaward of it a reef visible at low water; between this and the land there is a deep channel. Behind this point to the westward there is a small bay, clean and without rock. Beyond this bay is the mouth of the Rio Pernambuco, which is narrow (that is, 120 fathoms in breadth), with 4 fathoms water at low tide. On entering it widens and forms within a kind of lake, having 6, 7, and 9 fathoms water. At the entrance to this river there are heads of sand on both sides, running out a league to sea, and covered at high water; but in the channel and opposite to it, there are neither rocks nor sands, nor anything that is dangerous. As vessels proceed up the Iguaraçu, they will enter the Pernambuco, for they are both branches of one and the same river."

of the largest in Brazil; and is of the highest commercial importance. The Barra de Iguaruçu, the easternmost branch of the river, and the Barra de Tutoia, the westernmost, are separated by an interval of about 36 miles, and in this distance there are four other streams, namely the Barras Canarias, Meio, Caju, and Carapato. These streams or openings are formed by a group of low islets facing the main channel of the river, and in reality composing its *delta*. Five of the islets nearest the sea afford excellent pasturage for cattle.

The Barra de Iguaruçu and the Barra Canarias, the two easternmost passages, have become unnavigable, except for small vessels. Vessels now enter by the western mouth, the Barra de Tutoia, where a pilot may be obtained. The distance of Villa do Pernaibao from the eastern bar is about 8 miles.

On approaching the coast hereabout, in fine weather, you may see at the distance of 10 or 12 leagues to the south-eastward, the high lands of the interior, named the Serras dos Cocos, or Hybiappaba, which are the last mountains that come in sight between this and Maranhao in proceeding to the westward.\*

It is not considered advisable to approach the land between the mouths of the Paranahyba nearer than 4 or 5 miles, nor to get into a less depth than 8 fathoms. The sea is very muddy, and the bottom sand and mud before the mouths of Paranahyba. Vessels may find anchorage everywhere at 4 or 5 miles from the land, in from 8 to 10 fathoms, but the ground is not good for holding.

A reef, known as the Pedra do Sal, lies off the point of the same name, between the Barra Velha d' Iguaruçu and the Barra Canarias and is about 1½ miles from shore.

*Light*.—A *fixed white* light is exhibited from point Pedra do Sal, near the Barra Velha entrance of the Paranahyba: it is visible about 10 miles. Its approximate position is lat. 2° 50' S., long. 41° 44' W.

Westward of the Pernaibao the coast consists of sandy flats, and gradually decreases in height. In sailing along, some woods will be noticed in the interior of the country, but in other respects it appears very barren. This sandy shore is remarkable, being composed of downs of dazzling whiteness, destitute of verdure, which have the appearance of white cloth spread out, from which circumstance it has been named *Lencoes Pequenas*. These small downs occupy the space of nearly 4 leagues between the bar of Tutoia and that of Perguicas, near which are the breakers of the same name. The breakers of Perguicas are scattered along the shore, and of much less importance than hitherto represented, as by keeping 8 or 10 miles off this part of the coast vessels will be at a sufficient distance from the outer edge of these dangers, and have not less than from 7 to 14 fathoms water.

The *Rio Perguicas* is said to be deep enough to build large ships at some distance within its entrance; but further up it, the channel becomes difficult to navigate. The river may be said to separate the *Lencoes Pequenas* from the *Lencoes Grandes*. It has a long spit running from it, formed, as all the banks, and even the islands on this coast are, by the tide of the river meeting the current of the sea. H.M.S. *Sapphire* crossed this bank by night, in 5 fathoms, and the *Mersey* in 3½, but in 7 fathoms a ship will be quite close enough.

If the coast be made from the northward, about the Perguicas and Lencoes

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\* The information about this part of the coast is very scanty. It has not been minutely surveyed; hence great caution is necessary when navigating hereabout.

Pequenas, soundings will be struck in 19 or 20 fathoms, and soon after in 13; and thence regular bottom will be found in 10 or 11 fathoms, until the vessel is close enough to haul off and steer along the land. The land hereabout is green, interspersed with sand-hills. It is low and irregular; but in one place there is an extent of a mile or two of white sand, crowned with green of a regular height.

From the Rio Perçuicas the coast runs N.W. by W.  $\frac{1}{2}$  W. about 40 miles, and continues to bear the same remarkable appearance as that to the eastward just described; it is, however, of greater extent, and consequently becomes a valuable landmark for vessels proceeding to the westward, because by carefully observing the coast they are able to ascertain their position with considerable accuracy. The sandy downs are rather high, and of a white colour; their extent is about 12 leagues, and their whiteness has obtained for them the name of *Lencoes Grandes* (great sheets) in contradistinction to those to the eastward. It is said that nothing can better resemble white sheets spread upon the land, than these sand-hills.

The *Emily Shoal*, having 2 $\frac{1}{2}$  fathoms water over it, with 7 fathoms around, was discovered by a French vessel, the *Emilie*, grounding on it in 1837. It lies off the entrance of the river Perçuicas distant therefrom about 4 miles and its approximate position, according to M. Mouchez's survey, is lat. 2° 30' S., long. 42° 45' W. It is probably one of many other dangers off this part of the coast, which is imperfectly known.

According to Baron Roussin, the most westerly extremity of the *Lencoes Grandes* is in lat. 2° 21' S., and long. 43° 12' W. Their eastern extremity is in lat. 2° 34' 12" S., and long. 42° 45' W.

Immediately to the westward of the *Lencoes Grandes*, the land entirely changes its appearance: from being barren and destitute of verdure, it becomes covered with bushes and shrubs, so closely set, that at the distance of 4 miles the ground between them is not visible. This verdure, and the species of trees which appears most predominant, together with the little elevation of the land, have obtained for this coast the name of *Praya das Mangues Verdes* (green mangroves). The quick transition of colour contributes to make the division of the *Lencoes Grandes*, from the low grounds of *Mangues Verdes*, a good mark by which the coast may be recognised. The change in the appearance of the coast takes place at the point which forms the eastern side of the bay of Maranhão.

At 8 miles to the northward, and on the meridian of the middle of the *Mangues Verdes*, Baron Roussin found no variation in January, 1820. From this distance to 10 leagues from the land, the depth increases gradually from 7 to 37 fathoms, the bottom being generally of sand, gravel, and fine white sand. This is generally considered to be the limit of regular soundings, which are found almost everywhere all the way from the banks of San Roque.

**Santa Anna and Light.**—Santa Anna is a small island lying off the coast in long. about 43° 38' W. It is a little higher than the land just described, and is also covered with mangroves and other trees; it does not, however, present anything very conspicuous as vessels approach it from the eastward, "except its lighthouse"; but the opening between it and the continent, and the breakers surrounding it which extend to seaward, should enable a seaman easily to distinguish it, and so prevent him mistaking it for land in the vicinity. The lighthouse stands on the eastern part of the island in about lat. 2° 16' 30" S., long.

43° 38' 25" W. It shows a light *revolving* every 32 seconds, which can be seen in clear weather at a distance of 15 miles.\*

Santa Anna island is about 10 miles in length and 3 to 4 miles wide, narrowing to a point at its western extremity. In approaching it from eastward, the first breakers met with will be at about 10 miles E.N.E. from the north-east point of the island, and these continue to the westward almost as far as the meridian of its most westerly point. It will be prudent to keep at least 2 or 3 miles northward of these breakers, and to maintain a constant use of the lead, as well as a good look-out, because they are extremely dangerous; close to the edge of these reefs there is a depth of 10 to 14 fathoms water on sandy ground.

**Cæsar Shoal.**—One of the most dangerous of these shoals to the eastward of Santa Anna is that named the Cæsar, from a French vessel that struck upon it in 1824. It is distant about 9 miles E.  $\frac{1}{2}$  N. from the lighthouse on the east end of the island. It has been described as about  $3\frac{1}{2}$  miles in extent, and as very dangerous, in consequence of there being a depth of 6 or 7 fathoms close to it, so that but little warning is given by the lead. It is thought that at a short distance south of it there is another shoal, and that in its immediate vicinity there may be some shallow patches.

**San Jose Bay** is the space formed by Santa Anna island, the island of Maranhao, and the neighbouring continent. It is usually considered too shallow and dangerous even for small vessels, otherwise it might prove useful to those bound to Maranhao, as a passage through it would shorten the distance to San Marcos bay considerably. The coasters sometimes adopt this passage, but then they are well acquainted with the intricacies of the navigation.† There is said to be no

\* These particulars are very uncertain, it having been recently stated that the machinery of the light is bad, and that but little attention is paid to the lighting.

† Mr. Koster observes, that from some similarity between Itacolomi point, by which vessels are in part guided, when about to enter the bay of San Marcos (Maranhao), and another point of land upon the small island of Sta. Anna, which is at the entrance of the bay of San José, instances have occurred of vessels mistaking the latter for the former, and entering the bay of San José. This error causes great danger and inconvenience; because, owing to the prevalence of easterly winds, it is next to impossible for a vessel to beat her way out of it. It is, therefore, necessary that she should go through the narrow channel, between the main land and the island of Maranhao, a passage of considerable difficulty.

Mr. Koster further notices the following case of Captain Juan Roman Trivino, of the Spanish ship *San José*, who, in the year 1815, got into the bay by mistake. It appears that the captain had obtained an Indian pilot to take him to San Luiz, but that in consequence of mistaking the points of land referred to, the vessel was taken into San José bay. As is customary with all vessels bound to San Luiz, the lead was kept going, yet notwithstanding, it did not prevent the error occurring. The ship was brought to anchor in 11 fathoms water off San José, a small village situated upon the north-east point of Maranhao island. "Whilst they continued in the mid-channel of the bay, they found from 18 to 20 fathoms. The depth of water regularly decreases from the centre of the bay towards the land on each side; but it contains no insulated sand-banks. The ship was at anchor off the village of St. José two days; they then proceeded through the channel, which is enclosed on either side by mangroves, and is so narrow in some parts that the yards at times brush against the branches. The wind was fair, and they sailed through without being obliged to tow or warp the ship. The depth of water varied from 5 to

safe channel on the south side of Santa Anna island, the coasters consequently always pass it on the north side.

When Captain Wellesley, R.N. was at Maranhão, in 1833, he found a very strong tide setting into San José bay. The first time he was on the coast the current set him inside the reefs of Santa Anna, and obliged him to anchor in 5 fathoms, and he was afterwards compelled to stand out on a N.E. course to get clear of them. The breakers always show themselves, and should not be rounded nearer than in a depth of 14 fathoms.

The anchorage at Santa Anna subsequently visited by Captain Wellesley, was in 7 fathoms, very bad ground, with the lighthouse on the island bearing W. by S.  $\frac{1}{4}$  S., and the mangrove point S.E.  $\frac{1}{4}$  E. The tide experienced was flood at E.S.E., and ebb at W.N.W., nearly 2 miles an hour. The time of high water was 6h. P.M. on the days of full and change of the moon.

**SAN MARCOS BAY.**—San Marcos or Maranhão bay is formed by the west coast of Maranhão island and the mainland. Its entrance lies about S.W. and N.E.; its least breadth, between point San Marcos and point Tatinga, is about 7 miles.

San Marcos bay is navigable by vessels of the largest class; but as the banks in the vicinity of its entrance are extremely dangerous, it would be imprudent for a stranger to attempt to run up to the anchorage without a pilot. A vessel having made the land, and there not being sufficient daylight to permit her entering it, should stand off for the night, keeping on the meridian of Santa Anna lighthouse, and at such a distance as to ensure being in the fairway in the morning.

The **Coroa Grande banks**, extensive banks on the western side of the entrance of San Jose bay, are divided into several ridges, on the three principal of which the sea usually breaks, and especially during an ebb tide—the reefs do not show the second half of the flood. They are generally well defined and steep-to, the depth at a mile from their north and west sides being 7 to 22 fathoms, notwithstanding which they should not be approached nearer than two or three miles. From the north edge of the Coroa Grande, the island of Maranhão can be seen in clear weather; the island is higher than that of Santa Anna, and intersected with white cliffs. Opposite to the Coroa Grande shoals\* are the extensive flats

2 $\frac{1}{2}$  fathoms; the bottom was of mud. About half way through the channel, the tide from the bay of San José and that from the bay of San Marcos meet: this takes place nearly, but not quite, opposite to the mouth of the Rio Itapicuru. They were two days in sailing from the anchorage ground at San Jose to the island of Taus, which is situated near to the S.W. corner of the island of Maranhão. Here the ship came to an anchor in 9 fathoms water, with a sandy bottom; and the captain sent to San Luiz for another pilot, the man who had brought them thus far not being acquainted with the remainder of the navigation. The island of Taus is rocky, and uninhabited, and is covered with palm trees. The village of San Jose appeared to Captain Trivino to be of considerable size, but with the exception of two or three, the houses were built of slight timber, and of the leaves of different species of palm trees. Its inhabitants were mostly fishermen.

Since these remarks of Mr. Koster were written, lighthouses have been erected on Itacolomi point and Santa Anna island, which will remove, to some extent, the danger of mistaking them.

\* On the 16th of March 1869 a French vessel, *Les Trois Frères*, discovered a shoal about 6 miles northward of the Coroa Grande banks. Approximate position, lat. 2° 7' S., long. 43° 48' 50" W.

forming the Pirajuba flat, which extends out from the main shore, and lines the coast as far as Itacolomi point. Those known as the Coroa das Almas are extremely dangerous, there being only 3 feet water over one part. This 3-foot patch is distant from the western shore of the bay about 6 miles, and has 9 fathoms close to its eastern side, and 6 fathoms close to its western.

Outside the Coroa das Almas, and almost immediately in front of the main passage into the bay, is a dangerous shoal of 2 to 3½ fathoms, named the *Coroa de Peixada*. It lies about 12 miles East of point Itacolomi, and has 6 to 15 fathoms close-to, so that but little indication of its vicinity is given by the lead.

Within the Coroa de Peixada, and dividing the passage up the bay into two channels, is a shoal 7 miles long, named the *Baixo de Meio*. Its direction is nearly S.W. and N.E., and the depths over it vary from 2 to 5 fathoms. Close to its western side there are 22 to 18 fathoms, and between it and the Coroa Grande there are 11 to 9 fathoms, so that the channel between it and the Itacolomi shore must be considered the best passage by which to enter the bay, more especially as the limits of the Coroa Grande do not appear to have been clearly ascertained. The soundings on the eastern side of the shore are more gradual than those on the western side, but the channel is more confined, hence the western channel is always preferred by the masters of large ships. The bank was surveyed in 1845 by M. Tardy Montravel, of the French navy, and his examination gives evidence of great changes in the shape of and depth of water on the shoal since the survey of Captain Hewett, R.N., in 1814.

The space south of the Baixo de Meio, between it and the flats lining the shore of Maranhao island, is generally termed the Alagoas anchorage. It has a depth of 11 to 8 fathoms, and is a convenient stopping place for vessels unable to reach the port of Maranhao.

Immediately fronting the entrance to the port of Maranhao there is a bank 3 miles long, extending in nearly a S.W. and N.E. direction, named the *Cerva Bank*, upon the shoalest part of which are only 3 to 4 feet water. Between this bank and the shore is the road in which vessels generally lie. The depth in the road is from 8 to 12 fathoms.

As the prevailing winds are from eastward, a vessel bound to Maranhao should make the land eastward of Santa Anna island, about the Lençoes Grandes,\* and then steer to the north-westward along the coast, which should not be approached nearer than 10 or 12 miles in from 10 to 15 fathoms water. The influence of the flood tide has to be cautiously guarded against, especially when in the vicinity of the reefs of Santa Anna; it runs rapidly to the south-westward towards San Jose bay. These reefs are steep-to, and when the breakers are seen can be passed at a prudent distance, taking care to allow for the flood tide. If the wind is light or the weather hazy, a vessel should give them a wide berth, or she may be drifted on them, or else to a critical position in the channel leading to San Jose bay. The mean rate of the tide may be taken as 2½ miles an hour, the flood running about S.W. by W. and the ebb N.E.

*Anchorage.*—A vessel intending to remain only a short time in San Marcos bay will find a good berth in 10 or 11 fathoms, sand and mud, with smooth water, in the roadstead of Alagoas, north-eastward of fort San Marcos. The best anchorage in the road outside the harbour is with fort San Antonio, on Areas point, bearing S.E. by E. ¼ E. distant about a mile, in 7½ to 11 fathoms, over

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\* See note respecting dangers off Lençoes Grandes at foot of page 103.

sand gravel and shells. Small vessels anchor nearer the bank and rocks of Medo islet. This anchorage is convenient on account of its proximity to the port; but during strong winds the sea is frequently heavy, which sometimes occasions the loss of anchors.

There is anchorage always sheltered from the sea, and better adapted for vessels of large draught southward of Medo islet, in 11 fathoms, sand and mud. It is still better southward of Ataki point, in 15 to 16 fathoms, mud. The tide here is much less rapid, and the sea smooth; but that south of Medo islet has every security and the advantage of being nearer the town. Vessels should not anchor too near the bar, the bottom there being of quicksand (into which the anchors sink rapidly) with occasional patches of rocks.

**Lights.**—A *revolving* light, appearing *red* and *white* alternately, is exhibited from Itacolomi point, near the Morro Itacolomi. The light is bright for 50 seconds and eclipsed for 50 seconds; it is elevated 147 feet above the sea and visible 15 miles. The tower is square, and its position is considered to be lat.  $2^{\circ} 10' 10''$  S., long.  $44^{\circ} 24' 45''$  W.

On fort San Marcos,  $1\frac{1}{2}$  miles north-east of the entrance of Maranhão harbour, a *fixed white* light is shown, visible 10 miles. Position, lat.  $2^{\circ} 29'$  S., long.  $44^{\circ} 18'$  W. It is said to be an indifferent light.

**MARANHÃO.**—Maranhão, with the exception of Para, is the most important port on the north coast of Brazil. The island of Maranhão is very large, being not less than 28 miles long by 15 broad. It is very fertile, and if attention were paid to the cultivation of sugar, would produce it in great quantities. At its south-western end is the city of Maranhão or San Luiz, which is the capital of the province of Maranhão, and the seat of government. It stands on two small hills, bearing nearly East and West from each other, and is considered to be better built, as a whole, than any other city in Brazil. It exhibits a general neatness and an air of enterprise, which rarely appears in the other towns of the empire. There are, moreover, within its bounds but few huts and indifferent houses. It is divided into two parishes, and contains thirteen churches and chapels, three monasteries, and six hospitals, of which the *Misericordia* is the principal. Its educational establishment consists of a lyceum, a Latin school, two primary schools for boys, two for girls, four private schools, and an ecclesiastical seminary located in one of the monasteries. In importance it is reckoned the fourth city in the empire.

Several of the public buildings in San Luiz are very large, particularly the convents and churches, of which the principal is the cathedral; this occupies the north side of a square grassy plain, lying before the palace of government. The style of these public buildings is at once elegant and durable, as well from the neatness of ornament as from the solidity of construction, the walls being in general very massive, and composed of stone, broken fine, laid in cement. The streets are generally at right angles, and in consequence of the inequality of the ground, are not very suitable for carriages, so that but few vehicles of that description are in use. It is said that in the entire town there is but one good carriage road.

At San Luiz supplies of provisions may be obtained, and the various necessities required for navigation. The port is sufficiently safe to permit careening. The water is good and abundant, and on the island beef and rice may be had, but if needed in large quantities, it will be more advantageous to obtain them from

Alcantara, or the continent, because the land is there more fertile and abundant in cattle, fruits, &c.

The channel leading up to the town of San Luiz, and which is generally termed the Port, is very narrow. It has a sandy flat on each side of it, and should only be entered by a small vessel, under charge of some one well acquainted with the navigation. The depth is (or was in 1867) 2 to 3 fathoms, and when running in vessels pass close under fort San Antonio.

The temperature at San Luiz is very high, especially from December to June. This is mainly in consequence of the city being on the west side of the island, and hence more exposed to winds from the interior than to those from seaward.

The port of Maranhão was visited in about 1814 by Mr. Koster, and was thus described by him:—"We entered the bay of San Marcos with the lead going, took the channel to the eastward of the Baixo do Meio, or Middle bank, passed fort San Marcos, and came to an anchor opposite and very near to the sand-banks at the mouth of the harbour of San Luiz.

The port or harbour of San Luiz is formed by a creek in the island of Maranhão, and must be entered from the bay of San Marcos. The channel is sufficiently deep for common sized merchant vessels, but very narrow, and not to be entered without a pilot. Opposite to the town the water becomes very shallow with the ebb; and it is worthy of remark that the tide rises gradually more and more along the coast of Brazil from South to North; thus at Rio Janeiro the rise of the tide is but trifling, at Pernambuco it is 5 or 6 feet, at Itamarica 8 feet, and at Maranhão it is 18 feet.

The bay of San Marcos is studded with several beautiful islands, and is of sufficient extent to admit of considerable grandeur: the width from San Luiz to the opposite shore is nearly 4 leagues, its length is much greater; towards the southern part there are several sand-banks, and the water becomes much shallower. It receives here the waters of a river, along the banks of which are situated several cattle estates; but the Rio Itapicuru, which runs into the narrow channel between the main land and the island, enjoys the greatest share of cultivation; its banks are extremely fertile, and upon them have been established the principal plantations of cotton and rice, the chief articles of commerce at San Luiz. The island of Maranhão is, itself, very little cultivated. There is no considerable plantation upon it. A few of the rich merchants residing in the city have country houses distant from it about one league, but the remainder of the lands are left untouched; owing, it is said, to the unfitness of the soil for the purposes of agriculture."

Maranhão was visited in 1830 by H.M.S. *Chanticleer*, and was thus described by Mr. Webster, the surgeon of the sloop:—

"The island on which the city stands is separated from the continent by an arm of the sea, and is about 21 miles long by 12 broad. The city, notwithstanding its situation on an island, is the capital of a large province of the same name, and derives all its importance from the harbour, which is the principal one on that part of the coast.

The harbour possesses merit only by comparison with the few smaller on the coast. The entrance to it is extremely narrow and shoal, so that vessels can enter it at high-water only; for, when the ebb has ceased, the shoals are so bare that a person might walk across the upper part of the harbour. It is snug and well protected, affording secure and commodious anchorage for several ships. The tides are rapid, rising 18 or 20 feet; the anchorage is close to the town, where

there is a very tolerable landing-place. Strong winds seldom or rarely blow in so as to create any uneasiness among the shipping.

The harbour presents a cheerful scene, more particularly to a stranger unaccustomed to the novelty he meets there. There is something enlivening in seeing the numerous coasting vessels skimming along the surface of the water; the peculiarity of their rig, and the extraordinary thatched awning with which they are partly covered, their sails being of the lightest material, and fit only for the fine weather and light breezes which prevail on the coast. The business of these vessels is to transport cotton from one part of the coast to another. Whole fleets or fishing-boats are seen cruising about, some going out to their fishing-ground and others returning, the arrival of the latter being announced by the sounding of horns, which may be heard far and near; and, in the midst of these, the attention is continually excited by the incessant crossing and recrossing of canoes manned by African negroes. Some of these canoes are large, and have crews of 12 or 14 persons, who use their paddles in great dexterity, and all the energy peculiar to the negro.

The country about Maranhão is by no means attractive. It is without any peculiar features, rather pleasing, here and there picturesque, fertile, and well wooded; and when the distant hills and neighbouring heights of the main land are seen skirting the horizon of the bay, the effect is rather pretty. The banks of the river are adorned with a few country seats, the residences of wealthy proprietors; one of the handsomest of these is termed the Bellevue, or Taman-chão.

The city itself is seated on the eastern shore of the harbour, upon a jutting promontory or neck of land, and is nearly surrounded by water. It occupies the highest ground in the neighbourhood, and is 90 feet above high-water mark, being about a mile in length, and half a mile in breadth, and is irregularly built. The exterior of the city has but mean pretensions, and the most respectable parts of the interior are very little better. The streets are narrow, many of them of a low, mean appearance, and without a handsome one among them. The houses are neither lofty nor elegant.

There is nothing in Maranhão that particularly attracts the notice of a stranger, unless it be the cocoa-nut tree, gracefully waving its lofty plume above the houses, and imparting a tropical character to the place.

Near the water side is the market-place for the sale of fruit, vegetables, and poultry, with shambles distinct from all. Beef and pork are the only meats to be had there, and these of a very indifferent quality; but the town is generally well supplied with country produce, which is both reasonable and good. Besides the principal market-place, there are several other smaller ones in different parts of the town. The bread is excellent, the poultry good, the fruits and vegetables abundant, wines and groceries of a good quality, especially port wine. The town is in no want of water, wells are attached to most of the houses; but the water in some parts is said to be rather brackish, consequently that which is used for drinking is brought by the boats from some miles distant and distributed for sale."

**Alcantara.**—On the western side of San Marcos or Maranhão bay, and nearly opposite to the city of San Luiz, is the small town of Alcantara. It stands on a semicircular hill, and at first sight from the port seems very pretty, but falls short of its promise on a nearer examination. Many of the houses are one story in height, and are built of stone; but the major part have a ground-floor only. It

extends back to some distance, in a straggling manner, with gardens, &c., and is an improving place; the lands in the neighbourhood being in request for cotton plantations. It has a stone quay, a town-hall, a prison, and several churches. (1814.)

Mr. Koster, when at Maranhão in 1814, availed himself of the opportunity to visit Alcantara. He describes the sail from San Luiz as beautiful in the extreme, on account of the number of well-wooded islands which are scattered over the surface of the bay. The depth on the bar was found to be very little, and great care was necessary, although the vessel did not draw much water. From this circumstance we should conclude that the port is not capable of receiving foreign vessels.

*Light*.—A small harbour light, *fixed*, is shown on point Alcantara, to guide to the anchorage.

At a short distance from Alcantara there is an island about 3 miles long, by one broad, called the Ilha do Livramento. It has, or had, a chapel upon it dedicated to our *Lady of Deliverance*, and in years gone by it was customary with the inhabitants of the neighbouring shore to visit it annually for the purpose of celebrating, by festival, the invocation of the Virgin. It is possible that the custom may be still retained.

**Rio Itapicuru.**—The Rio Itapicuru is a large and important river, having its outlet at the back of Maranhão island. Its entrance has not been examined, but is believed to be 120 yards wide, with a depth of 10 feet water; this is not however permanent, as it greatly depends upon the heavy rains in the interior. The scenery on its banks is described as most romantic, the shores being very high, and lined with lofty trees, the branches of which almost meet in several places. The vessels used for the navigation of the river are of very shallow construction, because in some parts there is a depth of only 2 or 3 feet in the dry season, which increases, however, in the rainy months to 20 or 30 feet. At this period of the year the country is flooded; it is hence rendered uncommonly fertile; so much so, indeed, as to leave but little scope for industry. On the banks of the river there are many large *fazendas* or estates for the cultivation of cotton and sugar.

The most important town on the Rio Itapicuru is Caxias or Aldeas Altas, situated nearly 200 miles from its entrance. It has lately been brought into constant communication with Maranhão by means of a small steamer, drawing only 3 feet, which is of great use not only in ascending and descending the river with freight and passengers, but in towing vessels and small craft.

Ascending the river Itapicuru, the first important place arrived at is the Villa de Rosario, situated in a fertile district, and where many influential planters reside. Beyond this is Paioul and San Nicholas, and afterwards Itapicuru-Merim, to which vessels drawing 4 feet can go even in the driest season; but beyond this a vessel should not draw more than 2½ feet. The produce of the country watered by the river is brought down in canoes of about 40 tons burden, which carry about 300 bags of cotton. In the dry season the voyage is very long and tedious, but is accomplished with facility in the rainy season; it is however difficult to *ascend* the river at the latter period, on account of the strong freshes, which oblige the vessel to be hauled up by main force, by ropes taken from tree to tree.

The roadstead of Maranhão is bounded to the south-west by a small island, named *Medo*, which is separated from the shore by a narrow channel of 7 to 10 fathoms water. It is low and flat, and surrounded by a bank, upon which there are some rocks above water.

**Directions.**—It has been remarked by Pimentel, the old Portuguese hydrographer, that vessels bound to Maranhão ought to make the coast during the months from December to July, because these are the winter rainy months, when the land appears clear and bright, and no high winds prevail. August, September, October, and November are the windy months, and the land is then constantly covered with a thick haze: the higher the wind the more hazy it is. The winds that are constant are N.E., E.N.E., and East, and these are all fair to go into and out of the harbour. He also adds that, in general, vessels may anchor on the coast at two leagues from the land, but it should not be in less than 8 fathoms at high water.

CAPTAIN HEWETT, R.N., has given the following instructions (1814):—

"When ships are bound to Maranhão from seaward, it is absolutely necessary to make the land considerably to the eastward, as the currents in general set very strongly between W.  $\frac{1}{4}$  S. and W.N.W. If, in endeavouring to make the land, the latitude should be found to be  $3^{\circ}$  S. the vessel will be off mount Melancia, or between it and Ceara; if the latter, three other mountains will be observed to the S.S.E., lying nearly S.E. and N.W. of each other, which mountains are about 7 leagues to the westward of Ceara, and easily seen from that place. The soundings here will be fine sand and shells.

Should the land be made in from lat.  $2^{\circ} 15'$  to  $2^{\circ} 30'$  S., and the bottom be small red and white stones, the vessel will be off Jericoacoara. If the ground is found to consist of yellow, blue, and red stones, the vessel will be off Pernaibao, or Temonia, and three mountains will be observed lying nearly on the meridian of each other, in the neighbourhood of the latter.

The whole coast from point Macoripe to Pernaibao is sandy to about half a league inland, whence it appears to be well cultivated, so that it is easily distinguished from the coast between Pernaibao and Green Mangues point, which consists of nothing but sand, without the least sign of vegetation.

Inclining to the shore until about 4 leagues distant from it, and pursuing a W.  $\frac{1}{4}$  N. direction, the island of Santa Anna will be sighted, and by well observing the sand-banks in passing along the entrance to the Rio Perguicas will easily be distinguished. The land will now assume a higher and more irregular appearance; this height and irregularity do not, however, deserve the appellation of hills. When the Perguicas bears S.S.E., the water will begin to shoal to 8 or 9 fathoms: but a steady course should be pursued, as presently the spit formed by the sand washed from the river will be passed, which, meeting with the natural course of the current in the offing, inclines it to the north-westward.

Should the day be far advanced when off this part of the coast, haul to the wind under topsails and foresail for the night, and stand off into 22 or 24 fathoms, and on 12 or 14; but it will not be advisable to haul your wind before having passed the Perguicas. At daylight bear up under all sail, pursuing the former course and distance from the shore; and towards the termination of the sand-banks the land will begin to appear more fertile, and the Green Mangues point will be easily distinguished. When this point bears S. by W., keep a good look-out for the island of Santa Anna, and having discovered it, and brought it to bear S.S.W., haul off N.W. by W. until into the parallel of  $2^{\circ}$  S., when steer due West.

When Santa Anna island is lost sight of, bearing about S.S.E. (?), the vessel will be abreast Coroa Grande banks, and a good look-out should be kept from the mast-head; and if breakers appear, or the water shoal to less than 18 fathoms,

haul out half a point, but not more. The distance to be run on the N.W. by W. course will be about 13 miles, and on the westerly course 11 miles, including one mile an hour for the current, before altering the course to W.S.W.; which having done, look out without fear for mount Itacolomi ahead, and the Tapita Pera coast on the port bow.

Mount Itacolomi has the shape of a gunner's quoin, and is only rendered remarkable by the low land in its vicinity.\* When this mount is recognised shape a course so as to bring it to bear W.N.W., but not less than at the distance of 5 leagues; Alcantara point, at the above distance from the mount, will bear about S.W.  $\frac{1}{2}$  W. Here, if the weather is thick, or night far advanced, vessels should anchor."

CAPTAIN EDWARD ROSE, R.N., says (1815), "Vessels making the northern coast of Brazil, should not place much dependence on the periodical changes of the wind and weather. If the season is regular, variable winds with much rain must be expected in January and February; if not regular, the chances are that the wind will be mostly from the E.N.E., and the weather will be clear over head, but the atmosphere round the horizon dense and hazy: on the contrary, during the rainy season, the weather will be thick over head, and the horizon clear.

In the event of running down the coast during the wet season, and being desirous of making the land, I would advise hauling in so as to make Jericoacoara; but a better way, if the wind will allow, will be to get into the latitude of  $2^{\circ}$  S., and run on westerly to about  $42^{\circ} 40'$  W., when soundings will infallibly be struck; then, if not very early in the day, run about 60 miles, and anchor; but by no means proceed on thus if it should be dark, even should your reckoning make the vessel 30 or 40 miles distant from mount Itacolomi. But, if likely to make the land before dark, endeavour to get into the latitude of the mount, and then run for it; if the weather should be at all clear, the mountain will be distinguished at the distance of about 5 leagues, making like a small hummock or gunner's quoin.†

After making mount Itacolmi, stand in until the water shoals to 7 fathoms, then keep to the southward along shore; and if the water shoals too much, haul out a little, and it will soon deepen again."

CAPTAIN THE HON. WM. WELLESLEY, R.N., has given the following instructions for vessels visiting Maranhao:—

"There is no difficulty in navigating the northern coast of Brazil, if proper attention and caution be used. A strict look-out from the mast-head should be kept, the lead should be constantly going, and the distance from land both by day and night, should be considered doubtful.

The best part of the coast for a stranger to make is the Lencoes Grandes\*;

\* On the cliff of mount Itacolomi there is now a lighthouse consisting of a quadrangular building, the sides of which face the cardinal points. The light is described on page 89. Care should be taken not to mistake this light for that on Santa Anna island.

† In running for mount Itacolomi on the latitude of the mount, great care will be necessary to avoid the Coroa Grande shoals, as their outer limit is nearly on the same parallel.

\* Captain Mouchez, of the French surveying vessel *Lamothé-Piquet*, has recently (1867) examined the dangers fronting the Lencoes Grandes, between Penguicas and Maranhao; these banks are very dangerous and extend seaward to the distance of 8 or 9 miles.

because these sand-hills, from their whiteness, are remarkable, and extend so far; they commence in about  $42^{\circ} 45'$ , and terminate in  $43^{\circ} 12' W.$  Run boldly for the centre, or western extremity, and probably the green country about Mangues point will be made at the same time, also the lighthouse on Santa Anna island.

If the coast be made about the Perguicas and Lencoes Pequenas, soundings will be struck in 19 or 20 fathoms, and soon after in 13. (See the remarks on this part of the coast on page 94).

If the land be fallen in with so far to the eastward as Ceara, it will be higher than any to the westward, and the magnificent mountains, some leagues inland (the only fine feature on the northern coast of Brazil), will be seen. Point Macoripe may be known by its being a sandy bluff, terminating rather suddenly, and also by the lighthouse upon it. But, upon whatever part vessels advance, it will be needless to approach nearer than 6 or 7 miles, until, in fact, it is just clearly discerned off the deck; that is, if the object be to make a passage.

If vessels make the land towards evening, and have run sufficiently near to distinguish it, as above said, a N.W. by W.  $\frac{1}{2}$  W. course will not be more than a safe course to haul off and on for the night, or they may stand off to 22 fathoms in about  $2^{\circ} S.$ , and in to 17 fathoms.

It is supposed, then, that the land is made in the morning, about the Lencoes Grandes. The vessel will be running down to near the land, probably, on a W. by S. course. Having seen it clearly, haul off to W.N.W.; and having arrived at their termination, run about 10 or 15 miles, along a coast nearly quite green, the '*Mangues Verdes*.' From the mast-head Santa Anna lighthouse will be in sight, bearing, perhaps about S.W. by W.; it will be seen before the island on which it stands, and makes like a vessel under sail. Vessels are not sure of making the island itself until Mangues Verdes point bears S. by W., and it is essential to bear in mind, that the lighthouse is not on the northern extremity of the island. The dangerous shoals which run in a N.E. direction off it, will now be made out; and if the flood be found to be setting the vessel in, haul off in time to N.W. by W.

The tide sets very strongly into San José bay, and some precaution is necessary to prevent being carried into the bay by its influence. (See the remarks on the subject in page 96).

Having brought the dangerous shoals of Santa Anna abaft the beam, a W.  $\frac{1}{2}$  N. course may be steered with safety until the Coroa Grande breakers are passed. Captain Hewitt recommends a N.W. by W. course, but I steered W.  $\frac{1}{2}$  N. on the flood in perfect safety, making the two breakers; and steering the same course on the ebb, I was obliged to keep away W.S.W. to make them.

The Coroa Grande shoals always break: and I think it better to make them,

Old sailing directions recommend ships bound for Maranhão to make the land off the Lencoes Grandes, but its numerous dangers were then unknown; Captain Mouchez now states that this part of the coast should be approached with extreme caution,—not under a depth of 18 or 19 fathoms, nor within the distance of 10 or 12 miles, at which limit the low coast is just visible; he also adds that it would be more prudent to make the land further to the westward, near the breakers which extend off Santa Anna island.

Every year vessels ground on the banks off Lencoes Grandes, and the masters report that this has happened through following the supposed route of the French corvette *Bayadere*; this vessel undoubtedly passed over the banks, but that she did so without taking the ground must have been quite accidental.

because a fresh departure is thereby obtained which is advantageous if night be coming on, and anchorage be desired. If not considered desirable to make them, W.N.W. may be steered for 15 or 20 miles, and then West until Itacolomi is seen ahead. This mountain is the highest land on the coast, and makes at first like a small round island. Almost immediately afterwards the adjacent land appears.

If on approaching the depth should be as little as 9 fathoms, or less, haul off to the South, and gradually keep away again to S.S.W., when the water deepens, which course will lead up to fort San Marcos. If on making it, there should be a depth of 14 fathoms, S.S.W. may be steered at once. In running up this course, bear in mind that the flood sets toward Alcantara, and over the Cerca bank, and the ebb, on the contrary, will check you over to the Meio bank, and towards the edge of the Coroa Grande.

Look out now for San Marcos point ahead; it ought to bear from S. by W.  $\frac{1}{2}$  W. to S.W. by S., and if in the centre of the channel, soundings will hardly be obtained with the hand-lead; if the depth is as little as 9 or 10 fathoms, the vessel will be upon the edge of the Meio bank, and as a precaution, keep half a point or a point more to the westward; 14 fathoms is a very good depth to run up in all the way. I have had no soundings until the anchor was let go off fort San Antonio, in that depth.

The land about San Marcos, when first seen, makes like two small islands, the easternmost one having two sand-hills upon it, which look like two roads. The round fort and flagstaff soon appear, for which keep the ship's head, and fort San Antonio will be seen like a long low red house, a little to the westward of San Marcos. When within a mile of this latter fort, run along the land until it bears N.E. by E., and fort San Antonio E.S.E., then drop the anchor in from 10 to 14 fathoms.

When near the anchorage, the only danger to be apprehended in a large ship, is from the Banca de Cerca, which lies about a league off-shore, and the northern point of which lies about N.W.  $\frac{1}{2}$  N. from San Marcos. Unless there be a very strong tide running, or the ship is beating up, vessels do not come near this; if they should, however, the soundings decrease very gradually, and indicate its vicinity.

In beating out the pilot took the *Sapphire* over its north end, in 5 fathoms; and at low water there may be over its centre as little as 16 feet; but of this I am not positive. It lies somewhere about N.E. and S.W., and one of the marks for clearing it is, not to shut in with Ataki the two small islands of Espera, which lie off it. But I repeat, that, in common cases it does not lie within your track.

It seldom happens that vessels have to beat from Itacolomi to Maranhão, the wind being almost constantly to the eastward; but they usually have to beat out. One tide ought to bring the mount to bear from W.N.W. to West, when the pilot leaves.\*

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\* Captain Wellesley adds, "I do not approve of Captain Hewett's directions for Maranhão, for the marks which he gives for the *eastern* channel took both the *Sapphire* and the *Mersey* through the *western*; moreover that to the eastward is never used by the pilots, nor by any but small coasters. I have no hesitation in saying, that having once sighted Itacolomi, it would be difficult to get a ship into the eastern; so much simpler, and more direct, is the route by the western channel.

The following are two good spots for anchoring when in the roadstead off San Luiz. In a depth of 16 fathoms, with fort San Antonio bearing S.E., and fort San Marcos E.N.E.: and again, with fort Antonio E. † S., and fort San Marcos N.E. by E. I consider these two anchorages the extremes of the good ground, but prefer the latter. The *Sapphire* never lost an anchor, whilst the vessels near her generally did. It should be remembered that the tide in the harbour makes at least half an hour before it does outside."

LIEUTENANT STOPFORD, of H.M.S. *Pickle*, 1832, gave the following instructions for vessels proceeding to Maranhão:—

"Vessels bound to Maranhão may cross the Equator in longitude 40° W., which will enable them to fetch the Lencoes Grandes,\* a landfall deservedly recommended by Baron Roussin.

It has been customary to make the lighthouse on the island of Santa Anna, but an error in the longitude will be of less importance by making the Lencoes Grandes. A vessel arriving off Santa Anna, and not having sufficient daylight to find her way into Maranhão bay, may lie-to for the night, off and on the lighthouse, keeping it as near South of her as possible, distant 6 or 7 miles. As there is constantly a heavy swell on the coast, anchorage should be avoided if possible, as it is both difficult and dangerous to recover the anchor.

From Santa Anna a vessel should steer W. † N., or more northerly, as she will then give a berth to the breakers of the Coroa Grande, to which it is desirable not to approach nearer than about 3 miles, and mount Itacolomi will be discovered bearing about West. When distant about 10 or 11 miles† from the mount, alter the course to S. † W., till fort San Marcos is made out nearly ahead. San Marcos point should not be passed at a greater distance than 1½ miles, in order that the Cerca bank (on the starboard hand-going in) may be avoided. A reef of rocks runs off from the point, and to avoid this, it should not be approached within three-quarters of a mile. Outside this distance a vessel may coast along, until fort Antonio bears East or E. by S., when she should anchor, and wait for a pilot.

A vessel by following the above route to Maranhão, will avoid getting entangled among the swashways on the Coroa Grande shoals, which are very dangerous.

The inhabitants of Maranhão, in consequence of their harbour filling up, expect to be obliged to transfer their port of shipment to Alcantara. I visited this port, and am of opinion that it is preferable in many respects to Maranhão, being easier of access, capable of containing more shipping and sufficiently convenient to enable vessels to enter or leave at any time of tide, with the prevailing winds. The depth of water is also greater. The *Pickle* was anchored about one-third of a cable from the shore, in 7 fathoms at high water."

BARON ROUSSIN'S INSTRUCTIONS.—The bay of San Marcos, or Maranhão, was surveyed in 1820 by Baron Roussin, of the French Navy, and a chart, the result of the survey, was soon afterwards published. The following instructions are extracted from the Baron's *Pilote du Brésil*:—

"The winds in the vicinity of Maranhão are generally from eastward; it is therefore to the eastward that the coast is made, whether approaching from Europe,

\* See note at foot of page 103.

† It should be remembered that the Peixada bank lies about 12 miles from mount Itacolomi, and that it is shoal enough to take up a large vessel.

Guiana, or the West Indies. The only exception is with the wind at times between the North and West. At all other times gain sight of the *Lencoes Grandes*,\* which are described at large in page 94. This shore of white sand commences about 20 leagues E. by S. from Santa Anna island, and extends to the verdant coast of the *Mangues Verdes*, which terminates in a great elbow of land under the meridian of  $43^{\circ} 28' W$ .

The *Lencoes Grandes* may be approached to the distance of 4 or 5 miles; and the depth at this distance from them will be 5 to 9 fathoms. It is possible that an error of longitude, very easily made in this part, may occasion the *Lencoes Pequenas* to be mistaken for the *Lencoes Grandes*; in which case the vessel would be to the eastward of the little banks of *Perguicas* instead of to the westward. To avoid all uncertainty, keep at the distance of 10 or 12 miles from the coast, and continue in a depth of from 9 to 5 fathoms water. At this distance from the land the vessel will be between the parallels of  $2^{\circ} 30' S$ . and  $2^{\circ} 15' S$ . upon a mean course of *W.N.W.*, which is that of the coast.

When the meridian of  $43^{\circ} 20' W$ . is reached, which is about that of the middle of the *Mangues Verdes*, and at the distance of 7 or 8 miles from the land, steer westward; and it will not be long before the breakers at the N.E. part of Santa Anna island will be seen and also the island itself.\* In rounding these breakers at the distance of 2 or 3 miles, and leaving them to the southward, the mark to know when the vessel is westward of them, will be by bringing the highest land of Santa Anna to bear South a few degrees East.

After having sailed along the breakers to the northward of Santa Anna island, continue to steer West, a few degrees North, until nearing the breakers of *Coroa Grande*, which may be approached to the distance of 2 miles.

Possibly the breakers of *Coroa Grande* may be discovered by the quality of the bottom, which is of fine sand with black and red specks, and occurs very frequently near its meridian.

From the northern part of *Coroa Grande* there are two routes by which vessels may enter San Marcos bay, and arrive at the anchorage of San Luiz.

The *first route* consists in rounding *Coroa Grande* to the northward and westward, attending to the soundings, which ought never to be less than 10 or 12 fathoms while upon the edge of the bank; and afterwards, in running along the western coast of Maranhão, the north part of which will be seen at the same time with the breakers, provided the weather is clear. We have already stated that, independent of the greater elevation of these coasts, Maranhão island is also distinguished from Santa Anna, when coming from seaward, by the steep white cliffs on its northern part. The first part of Maranhão observed, in following the western edge of the *Coroa Grande*, is that of San Marcos, which gives its name to the bay; it is high land, and terminates in a sudden declivity towards the sea, having on its summit a watch-tower with a signal-post. This point runs out under water, as the coast does also to the southward, with some ledges of rocks and sand extending about 4 cables which must be carefully avoided.

\* See note at foot of page 103.

† In sailing along this part of the coast, the Emily shoal and the Cæsar bank must be carefully avoided; see pages 94 and 95, in which they are fully described. The tide also requires attention, and a due allowance must be made for it according to its direction and strength. The flood, as already noticed, sets to the S.W. and the ebb to the N.E., sometimes with a velocity of two miles an hour.

In continuing a S.W. and S.W. by S. course, the vessel will soon be abreast the little fort of San Antonio de la Barra, situated at point Areas, which is the north point of the entrance to the port of San Luiz. This point forms the southern extremity of the ledge of rocks and sand which we have just described, and vessels should not approach it nearer than half a mile, while to the westward; at this distance the depth is 35 or 40 feet at low water, and opposite to fort San Antonio, where vessels may anchor.

The *second route* to the port of San Luiz consists in making for the Morro Itacolomi, a little mountain on the continent, situated at the western side of San Marcos bay, and very near the parallel of the northern edge of the breakers of Coroa Grande: this mountain resembles a sugar-loaf hat with a broad brim; it is entirely covered with tufts of trees, and is visible 5 or 6 leagues off when the weather is clear. Its isolated appearance upon the flat coast makes this mountain very conspicuous; the land to the southward continues in a southerly direction, while that to the northward turns sharply off to the west at a little distance; in fact, there does not exist any object in the vicinity of San Marcos bay which you can mistake for this mountain; and therefore it is commonly taken for a point of departure, as well as a mark or landfall, on arriving on the coast.†

When 6 miles to the eastward of mount Itacolomi, the course into San Marcos bay is directly South for 15 miles, which will lead abreast point Tatinga, and about one league to the eastward of it. From this position steer S.S.E. toward point San Marcos; but only make this direct course at ebb-tide or slack high water, in order to avoid being carried by the stream upon the north-east end of the Cerca bank, where there is but little water at low tides. It will be better then to bring point Tatinga West, distant 3 miles, and then steer about 4 miles to the S.E., as this course will take a vessel nearly 2 miles N. 38° E. (*true*) from point San Marcos; from this position steer along the coast of Maranhão, at the distance of 7 or 8 cables, in a depth of 9, 11, and 7 fathoms, up to the anchorage, as we have advised in the first route.

Throughout all this track, from the parallel of Itacolomi, it is only necessary to keep the lead constantly going until eastward of point Tatinga, in order to avoid the Meio or Middle Bank, which may easily be done by keeping 4 or 5 miles from the coast of the continent.

After having made the first part of your passage in entering, and having crossed the bay to point San Marcos, you will obtain a good mark to assure yourself of being to the eastward of the Cerca bank, and at a sufficient distance from it and the coast of Maranhão. This mark is, the two small islands situated to the south of the island of Medo, or Fear, brought a little open.

The best anchorage for a large vessel before the port of San Luiz is from 6 cables to 1 mile N. 64° W. from fort San Antonio de la Barra; as there vessels will find from 32 to 47 feet at low water. Small vessels may go nearer to the fort, and place themselves between the fort and the little bank of Medo, which

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\* The lighthouse on the Morro, already described, will help to distinguish it. Vessels should not approach the lighthouse nearer than the depth of 8 to 10 fathoms on account of the off-lying shoals. It should be borne in mind that a dangerous cluster of rocks, nearly even with the surface of the water, lies at the distance of about 1½ miles E.N.E. from the lighthouse.

lies somewhat to the westward. Our anchorage in the ship *Bajadore* was with point San Marcos N. 64° E., fort San Antonio N. 74° E., and the middle of Espera island S. 40° W.—(all true bearings).

The anchorage before San Luiz is bounded on the S. and S.W. by point Guia, Maranhão, by Medo or Fear island, and by the banks, on which at low tides there is but little water; to the E. and N.E. by the coast of Maranhão: on the S.E. by the banks which line the coast, south of the entrance of the port; and, lastly, about 2 miles to the N.W., by the Cerca bank, already mentioned, which we designate by the name of the bank De Ilha das Pacas, and which has on it in certain parts only 6 feet water at low tides. Independent of the passage to the northward of this bank, vessels can also go to the southward of it, and pass between it and the island of Medo; but this passage ought not to be adopted, except when the wind is N. or S. westerly; when the wind is from the eastward, it is plain vessels should give a preference to that by the coast of Maranhão, in order to enable them to reach the anchorage of San Luiz by tacking.

The entrance to the port of San Luiz is not dangerous for small vessels. Large vessels, drawing much water, cannot tack in the passage, and must therefore have a fair wind; if drawing over 20 feet, they must wait for high tide.

At Ataki, S.W. of Maranhão, there is a convenient place for vessels of a draught of water too great for San Luiz, to repair such damages as may be necessary. The bottom is of mud or ooze, and the depth from 15 to 16 fathoms, so that the anchorage is rather a desirable one, more especially that the stream of tide is not so strong as at San Luiz. After doubling Medo island, the distance is about 2 miles.

*Seasons, &c.* On account of the winds, and other meteorological phenomena, the year may be divided into two seasons: winter, which commences in December and ends in May; and summer, which continues throughout the other months. The first of these is the rainy season, when the rains fall most abundantly, and are accompanied with violent storms, particularly in the months of February, March, April, and sometimes in part of June. Thunder and lightning are then almost constant, attended with squalls and strong winds from the North to S.W. by the South; nevertheless, storms are not experienced at all times, and in the worst of the trade-winds there are long intervals of tolerably fine weather. Sometimes it rains in the summer; and in this season the winds most commonly blow from E.S.E. to N.E. by E., which are the general winds.

The air is very wholesome, and we do not know of any serious endemic diseases. In the rainy seasons a few fevers will sometimes assume a dangerous character; but these soon cease by a proper treatment. The best preventive will be a regimen devoid of all excesses: the principal remedies are evacuants, particularly emetics.

The commerce of Maranhão consists principally of cotton, rice, leather, ginger, and ipecacuanha. The quantity of cotton exported in 1820 was 70,000 bales, of the weight of 170 lbs. each. The tides at San Luiz and San Marcos bay are regular. At the anchorage before mentioned, the stream of flood runs to the S.S.W., and the ebb from N. to N.N.E., their velocity being one and seven-tenths of a mile per hour with the ordinary tides, and two and a half at the springs. In the latter case the rise of the tide is 16 feet 4 inches, according to our observations, made 36 hours after the new moon of January, 1820, near fort San Antonio. In ordinary tides the vertical rise of the water is only 10 feet."

M. L. TARDY DE MONTRAVEL.—Maranhão, or San Marcos bay, was surveyed

in 1845 by M. L. Tardy de Montravel, of the French Navy; and a chart, the result of that survey, was afterwards published. The following is a copy of the instructions which have been drawn up by M. Montravel, in the form of an explanatory memoir, to accompany his charts of the northern coast of Brazil.\*

"The part of the coast in the vicinity of Maranhão or San Marcos bay, which should be made by vessels from the northward or eastward, is undoubtedly that between the Rio Periquicas and Santa Anna island, and commonly designated the Lencoes Grandes, or Great Sheets. Baron Roussin is also of this opinion.†

San José bay, though filled with shoals, presents nevertheless a channel between Santa Anna island and the continent, which leads to the anchorage of San Luiz, going round the south side of Maranhão island; but this channel is of extremely difficult navigation, and very seldom taken by any vessels, and then only because that having entered the bay by mistake, or been driven there by the force of the currents, they are obliged to continue so dangerous a route. As the flood-tide runs rapidly to the S.W., to the mouth of the bay, it is prudent, on leaving the beach of Mangues Verdes in order to pass well to the north of the breakers of Santa Anna to avoid their influence, to go further northward in the track. The banks of Santa Anna being very steep, they can always be passed safely at a short distance, but some care is necessary to avoid the effects of the flood tide, which is estimated here to run  $2\frac{1}{2}$  and 3 miles an hour. If during a slight breeze vessels pass too close to the reefs, it is quite possible that they may be driven on them, or else into the west part of the bay of San José, when they would be in a very critical situation.

*Coroa Grande*.—Supposing, then, that you pass 3 miles to the north of these banks, when on the meridian of the lighthouse, you will steer W.  $\frac{1}{2}$  N. to pass some miles to the northward of the extreme point of the great bank of Coroa Grande, which extends  $12\frac{1}{2}$  miles northward of the north point of the island of Maranhão. This bank is formed of several flats, of which the three principal generally, but do not always, break. The corvette *La Bergere*, which anchored for two days on this bank, observed that it always broke while the ebb lasted, and that the three principal groups did not show during the second half of the flood. It has been said that there are some channels across the Coroa Grande, and between it and the coast of Maranhão, but the navigation of *La Bergere* proves positively that they are scarcely navigable.

When, after having left the meridian of Santa Anna, the vessel has run 26 miles on the track I have mentioned (in which route the force of the currents ought to be allowed for, the mean rate of which may be taken as  $2\frac{1}{2}$  miles, the flood running S.  $56^{\circ}$  W., and the ebb N.  $45^{\circ}$  E.), the northern groups of the Coroa Grande will have been passed, the breakers on which will have been seen if the state of the sea allows it.

*Morro Itacolomi*.—Now steer West and make the Morro Itacolomi, before described. On this point is the lighthouse, which was much required; as the ground was not sufficiently firm on the morro, the lighthouse was built on the cliff itself, 1090 yards E.  $\frac{1}{4}$  S. from the morro; the light revolves, appearing alternately red and white.

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\* Extracted from the "Instructions pour naviguer sur la côte septentrionale du Brésil, et dans le Fleuve des Amazones." Par M. L. Tardy de Montravel. Paris, 1847.

† See note at foot of page 103.

In fine weather the Morro Itacolomi may be seen 18 or 20 miles off, like a small conical islet on the horizon, and will continue so between East and West, to the distance of nearly 10 miles.

*Point Tatinga.*—Then steer S. by E. until point Tatinga, the extreme land in sight to the S.W. is brought to bear S. 40° W. With this bearing on, run S.S.W., so as to bring the same point Tatinga to bear S.W. by W. (S. 56° W.), and then run for fort San Marcos, which will be observed on the horizon like a small hill, bearing S.  $\frac{1}{2}$  W.

*Coroa Peixada.*—In the route just described vessels will have constantly had a depth of 18 to 15 fathoms, except in one part, about 13 miles West of the Morro Itacolomi, where there is a bank, on which 3 $\frac{1}{2}$  and 4 $\frac{1}{2}$  fathoms will be found, known to the pilots by the name of the Baxo or Coroa de Peixada. It extends about 2 miles N.E. and S.W., with regular declivity, though the east and west sides are steep. It forms no danger to a vessel drawing less than 16 feet, but will be a good means of ascertaining your position on the parallel of Itacolomi. Having made this bank, and proceeding southward, bring point Tatinga to bear S.W.  $\frac{1}{2}$  S. (S. 40° W.).

*Coroa das Almas and Bank do Meio.*—In following the previous route vessels will have left to starboard the *Coroa das Almas*, and the great flat of unequal depth which separates it from the coast, and which, continuing to the southward to point Pirarema, follows in an irregular curve the N.N.W. direction of the land as far as the parallel of Itacolomi. To the left they will have passed along the bank Do Meio, mentioned by Admiral Roussin, which lies in the middle of the bay of San Marcos, and is 6 miles in length, S.S.W. to N.N.E., with a mean breadth of half a mile. This bank consists chiefly of fine grey sand, very light, and marked with black specks, into which the anchors penetrate deeply. When at its south extreme, point Tatinga will be on with the centre of the isle Livramento, bearing W. by S.  $\frac{3}{4}$  S.; fort San Marcos, S.S.W.  $\frac{1}{2}$  W.; and the white patch of Pirarema, W.  $\frac{1}{2}$  N. From its extreme north end, point Tatinga will bear S.W. by W.; point Pirarema W.S.W.; and Itacolomi, N.W. by W.  $\frac{1}{2}$  W.; but from this point it will not be possible to see the land distinctly, unless the weather is very favourable.

The soundings vary on this bank from 13 feet to 6 fathoms at low water; its western side is steep-to, so that the lead affords no indication of your approach, and, at the same time, the great distance of the land renders this still more uncertain. The Coroa das Almas, which forms the other side of the channel, has the same difficulty in distinguishing by the lead.

The only direction that can be given for avoiding both these banks is to keep the highest part of point Pirarema within the angle between the bearings of S.W.  $\frac{1}{2}$  S. and S.W. by W. For its south-western extreme vessels will go clear of it by keeping the coast and the Morro of San Marcos on the bearing of S.S.W.

*Bayadere Passage.*—If, having well recognised the breakers of the Coroa Grande, vessels wish to run to the anchorage of San Luiz de Maranhão, they may do so by following the directions given by Admiral Roussin, on pages 107—108.

*Outer Anchorage.*—When, by either of these routes, vessels have approached fort San Marcos to about 2 miles, they should wait for a pilot, if they wish to enter the port of San Luiz. If intending to remain in the outer anchorage they must steer on the middle of the *Boqueirao*, a channel formed by the isle Do Meio and the islet Espéra, and anchor when fort San Antonio, which is raised at the

entrance of the port on a sandy point known as Ponta das Areias, is brought to bear S.E. by E.  $\frac{1}{4}$  E.

By keeping the Boqueirão open, vessels may be certain that they are to the eastward of the Cerca bank.

*Interior Anchorage.*—I would not advise any captain who has not been frequently in this port to bring in his vessel without having previously taken a pilot for the bar. If, nevertheless, it is indispensable that he should enter at once, these are the directions to follow:—At low water the banks are sufficiently uncovered to show the passage perfectly; but it is not so at high water. Vessels must then steer so as to pass a short distance from Ponta das Areias. When they have opened point San Francisco, and the eastern angle of the barracks, nearly a sail's breadth, bear round quickly to port, and then run on so as to pass at a cable or more to the south of fort San Antonio, whence they may bear up for the city, keeping to the windward side. It would be as well, when abreast point San Francisco, to bear off a little so as to avoid a point which projects from it under water.

*Areias Point and Minerva Bank.*—The only two points to dread are those which form the south point of the entrance of the port. To ground on either of them is dangerous, for the sea sometimes breaks on them very heavily, but all over the port, to run aground only occasions loss of time and trouble.

The anchorage before fort San Antonio is the most commodious, on account of its proximity to the port, but the sea is frequently heavy in the season of strong breezes; and the bottom being of madrepore (coral), covered with a bed of sand, the loss of anchors is also to be guarded against.

*Anchorage south of the Isle do Medo.*—The anchorage best adapted for vessels of a large draught of water, and which have to make some stay at Maranhão, is that to the south of the Medo isle. There will be found at that part a depth of 11 fathoms, with a bottom of sand and mud, and always sheltered from the sea. It is still better at the back of Ataki, but that to the south of the isle Do Medo has every security, and at the same time is nearer the port.

The track to this anchorage is to steer so as to pass to the west of the Cerca bank, and to go round the Medo isle to westward, so as to come to the anchorage on the south. A glance at the plan will show better than any directions how readily this anchorage is arrived at.

*Tides.*—The tides are regular in the port of Maranhão, and throughout the bay. The currents vary a little in their direction at different parts; at the anchorage of *La Bayadere* the flood runs S.S.W., and the ebb N.N.E. South of the Meio bank they run, the one to the S.W. and the other to N.E. The maximum rate is  $1\frac{1}{2}$  mile in ordinary tides, and  $2\frac{1}{2}$  at spring-tides. The rise and fall is 11 feet in ordinary, and 17 ft. 9 in. at spring-tides, according to the *Pilote du Brésil*, at the entrance to the port. At the custom-house quay, within the port, we have found the ordinary rise and fall 10 ft. 9 in. and 16 ft. 5 in. at spring-tides. The time of high water (establishment of the port) is 7 hours."

*Directions for leaving Maranhão.*—The following instructions for leaving San Marcos or Maranhão bay are by Baron Roussin, 1820 :—

"The route from San Marcos bay will be easily understood by a consideration of the directions for entering, previously given; nevertheless, we will here repeat the principal rules by which vessels ought to be guided.

From the anchorage before San Luiz there are two routes by which vessels may leave the bay if the winds are favourable, which are indeed the same routes

by which the bay is entered. One of these will be by steering so as to pass to westward of the Meio or Middle bank; the other to go to the eastward of the bank, ranging along the island of Maranhão and the banks of Coroa Grande. But the prevailing winds in this passage being from the eastward, the latter of these routes will often be impracticable; and if the winds will allow vessels to take the other, it is rarely on a direct course, or without some deviations.

Supposing the winds to be from the E.N.E. to the E.S.E., which are the most frequent, in quitting the anchorage at San Luiz, tack to the starboard, and endeavour to steer so as to make good a N.  $\frac{1}{2}$  W. course.\*

Having taken care, as is necessary under such circumstances, to get under way at the moment of high water, the first tack, assisted by the ebb-tide, will allow the vessel quickly to run over the little bank of Cerca, which will be recognised by suddenly passing from a depth of 13 and 16 fathoms, to 9, 7, or even 4 fathoms at one cast of the lead; but the latter depth will only be obtained for a short time, as the bank is very narrow. The marks for the north end of the bank, on which there are only 9 feet at low water, are the outermost of the two islets to the southward of Medo, nearly in one with point Ataki, and fort San Marcos bearing S. 58° E.

If the first tack takes the vessel to the westward, continue the above course nearly to the continent, which will be made more or less to the northward, according to the wind and tide. The current, as before observed, drifting the vessel to the N. and N.N.E. through the whole of the bay, one ebb will be sufficient to carry her outside, if sailing at the time of high water.

Vessels may approach the shore of the continent within 2 or 3 miles, at least small vessels may do so; but we repeat, it will not be prudent to go in this part of the bay, into less than 12 fathoms, more especially with large ships; besides, having regard to safety, this precaution is requisite on another consideration, which we shall presently mention.

Having continued on this tack till into the before-mentioned depth, put about for the island of Maranhão, and get close-hauled on the port tack until into 12 fathoms. It is probable that the second board will complete the track out; but if it should not do so, continue tacking as long as the ebb runs, never getting into less than 12 fathoms.

In keeping your tacks within the above limits, all danger of the Meio Bank will be avoided. To the southward of this position, and as far as the north point of the Cerca bank, all vessels may cross the bay in safety after one hour of flood. It is asserted, moreover, that to the eastward or westward of a very narrow space, lying north and south, and comprised between those two parallels, vessels may tack without danger, taking the precaution we have already mentioned.†

The mariners belonging to the country agree in giving a preference to the channel which runs along the continent, to that which runs along the coast of Maranhão and the breakers of Coroa Grande; and we are of the same opinion, especially if they are leaving the bay, and take advantage of the current. The first channel is the deeper of the two; and for this reason the current, which always assists a vessel in tacking about, is stronger there, and consequently more

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\* We think that this is an error. We should say N.  $\frac{1}{2}$  E., or N. by E.; but, see the chart.

† See the previous remarks of M. Tardy Montravel on the Meio or Middle bank, page 111.

advantageous than in the other. It is from a similar reason that we advise vessels to keep between the soundings of 12 fathoms, although they may go without danger into 10 fathoms, or even under, on both tacks. The velocity of the stream is in proportion to the depth; and the middle of the chanel being deeper than the sides, it is there that the current is most rapid, and consequently the most favourable.

If the wind blows between the S.E. and S.W. at the time of your departure, and it appears likely to continue, the most favourable route will be along the shores of Maranhão, and the eastern edge of the breakers of Coroa Grande; in doing which vessels must follow the contrary directions to those given for entering. Having arrived 2 or 3 leagues to the eastward of the Morro Itacolomi, vessels generally leave the pilot. From this time there will be only one obstacle to avoid in the track to the northward of Maranhão, and that is the shoal of Manoel Luiz."

M. L. TARDY DE MONTRAVEL says, 1847.—"Supposing a large ship anchored before the harbour of San Luiz wishes to leave the bay when the wind is from the E.N.E. to E.S.E., she should get under way at high tide, and steer W.N.W., so as to pass to the southward of the Cerca bank, which will be accomplished when the little islet to the N.E. of the Isle do Medo bears to the east of the easternmost of the two Espera isles. The lead indicates the depth sufficiently. Then bear up as close as possible to the wind, and run on until about 2 miles from the shore of the continent.

So long as vessels are to the south of the white patch of Pirarema bearing W.  $\frac{3}{4}$  N., they may tack from one side of the bay to the other without fear of the Meio bank; but, when they are to the north of this bearing, they must keep within the following limits:—To avoid the Meio bank, while to the south of the high lands of point Pirarema, keep to the west of the bearing of fort San Marcos to the S.  $26^{\circ}$  W., and when to the north of the parallel of the same high lands of point Pirarema, keep to the west of the bearing of point Tatinga at S.  $56^{\circ} 30'$  W. The Coroa das Almas and the bank of Pirajuba will be cleared by keeping eastward of the line of point Tatinga in one with point Raymondo, bearing S.W.  $\frac{3}{4}$  S. These banks being steep, the lead gives scarcely any indication of an approach to them; it will be prudent therefore to keep within the above bearings.

When leaving the port at high water, a vessel, though of large draught, as soon as point Areas is doubled, can keep on the port tack without fearing the Cerca bank, on which there will be a depth of 20 feet at high water. A small vessel also, at any hour of the tide, need take no notice of the Meio bank, as there are never less than 13 feet on it at low water; and thence vessels may tack from one side of the bay to the other—that is to say, from the banks of the Coroa Grande to those of the Almas; but as the ebb is generally stronger on the western side of the bay, it will be better to tack in that part of it. It is for this latter reason that the pilots prefer the western passage to the eastern for large ships on leaving; nevertheless, the lead is a better guide in the latter than in the former.

I would advise a vessel leaving too late, or hindered by any cause so as not to be able to get out in a single tide, to take the eastern channel in preference, in order to choose an anchorage at the end of the ebb-tide. The sea there is more tranquil, and the bottom better than in the western channel.

A vessel having but a short time to stay in San Marcos bay will do well to stop

at the anchorage named by the pilots the Road das Alagoas, to the N.E. of fort San Marcos, because that in it there is an excellent bottom in 10 and 11 fathoms water, and a quiet sea.

A vessel brought to the parallel of the Morro Itacolomi is considered out of the bay, and is consequently left by the pilot."

## FERNANDO NORONHA.

**FERNANDO NORONHA.**—The position of Fernando Noronha has been well ascertained. According to the most recent determination (1871) the Peak or Pyramid, on the north side of the island, is stated to be in lat.  $8^{\circ} 50' 10''$  S., long.  $32^{\circ} 25' 30''$  W.

Fernando Noronha is about  $4\frac{1}{2}$  miles in extreme length from E.N.E. to W.S.W., and about  $1\frac{1}{2}$  miles in breadth. It is irregular in shape, and its southern shore appears to be very much indented. It is evidently volcanic; and the Pyramid, its chief natural curiosity, bears traces of such origin. This is a high rugged peak on its northern shore, estimated to rise to the height of about 1000 feet, which is so peculiar in form, that at a distance it is said to be not unlike a church steeple; it is consequently, a good object by which to recognise the land. Some of the cliffs of the island present an appearance as if they had been white-washed. At 500 yards N.W. of the Pyramid or Peak there is a range of very fine basaltic columns in a horizontal position, each of which is 6 or 7 feet in length and  $1\frac{1}{2}$  feet in diameter, and disposed in prismatic joints in the most perfect order.

The shores of Fernando Noronha have been only partially examined. It is uncertain how far the bank of soundings extends from it, probably not to a great distance, as at only  $1\frac{1}{2}$  miles N.N.W. from the citadel there is a depth of 25 fathoms, and the bottom appears to be very steep.

Northward of the N.E. point of Fernando Noronha there is a group of islands named Rat, Booby, St. Michael's Mount, Egg, Platform, and the Cloven rock, which are separated from each other by shallow and narrow channels.

Rat or Wooding island is the most northerly of these islands. It is about a mile in extent, and surrounded by rocks, so that it is frequently difficult and even dangerous to land. On its south-west side there is a cove where it is usual to land; but landing may also be found on its north-east side.

Booby island is separated from Rat island by a very narrow channel. It is wooded, and difficult of access. Mount St. Michael and Egg island are both high; the latter, and also Platform island, are connected to Fernando Noronha by a reef.

The *village* on Fernando Noronha is situated between the citadel and fort Concepcao, about a mile eastward of the Pyramid, and will be readily recognised by the chapel, the hospital, and house of the governor, and also by the fortifications of the citadel. Here is a large cistern, a bathing-house, and the prison in which the convicts are every evening shut up after their day's liberty.

On the northern shore of the island there are several small coves formed by the indented coast; there are also some rocks detached from the land, of which

we may mention that situated near the citadel, named the Grange, and two others, 1½ miles west of the Pyramid, known as the Twins. Behind these latter rocks there is a fort on the cliffs, named San Joachim, and west of them an open bay with a rock in it, named Portuguese bay: this bay affords no shelter, as it is quite exposed to the northward.

The south-west point of the island is named Placelière (Point of the Pierced rock), because, at a short distance from its extremity, a passage has been worn through the rock by the action of the sea. This passage is said to be very conspicuous at a distance, and a valuable mark for vessels, as it enables them to ascertain with precision their position in reference to the land. It is prudent not to round this point very closely, because a rock under water, the exact position of which has not been ascertained, lies about a quarter of a mile off its extremity; between it and the land there is probably a depth of 14½ fathoms.\*

From the extremity of Placelière point to Tobacco point, the south point of the island, the distance is about 2½ miles. Between, the coast bends inwards and forms a bay named Statue bay, on the shore of which is South fort. In this bay there are two islands, known as Maire and Goulette, of which the latter is said to resemble a statue; hence the name of the bay.

Tobacco point has a dangerous reef extending from it to a distance of about half a mile, in a southerly direction. On its eastern side there is a bay, named the Port, which, if it were deep enough for vessels of moderate draught, would be the most valuable place of shelter in the island; but unfortunately there are not more than 7 feet of water in some parts of it, although at the entrance there is a depth of 16, and 10 feet. Facing it are two islands, Frigate and Jones, which are connected to the east point of the bay by a reef, so that the passage in is west of them through a channel a cable wide. At the head of the bay there is a small stream, and near it a fort.

From the Port to the East point of the island the distance is about 2 miles, and the coast is bordered by a reef of rocks which extends a short distance out. Off it there are some detached islets, named the Geese and the Steeples. There are also two rocks at a mile due East (true) from the point, which, from their resemblance to and position as respects each other, have been named the Brothers.

The coast from the East to the N.E. point, a distance of 1½ miles, is unapproachable by reason of a reef running along its base.

*Tides, &c.*—The tide in the roadstead of Fernando Noronha rises about 6 feet, and flows on the full and change days of the moon until 4h. The greatest set of the tide observed in the roadstead by Lieut. Lee, was ⅓ of a mile westerly in each hour.

The currents in the vicinity of Fernando Noronha generally set westward with considerable strength, but sufficient observations have not been made to determine their rate. Seamen should be aware of this westerly tendency, and make allowance accordingly when bound for the island.

*Dangers.*—In general the dangers about the coasts of Fernando Noronha are

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\* The *Sire de Vivonne* is reported (1863) to have struck on a rock about ¾ of a mile S. 2° W. (true) from the S.W. point of the island. It is described as 6½ feet under the surface, and of pinnacle form; when on the rock soundings of 20 feet were obtained from the quarter. Midway to the shore the sea was observed to be breaking on another rock.

visible above the water, or make their presence known by breakers; there is, however, an exception to this in a reef 2 miles from the south shore of the island, in the direction of S.E. from Tobacco point. This reef is about 3 cables in extent, under water, and in a calm sea is extremely dangerous, as then there is nothing to indicate its vicinity; it is, however, more usually the case that the sea breaks upon it with great and sudden violence. The marks for it are, the Pyramid N. by W.  $\frac{3}{4}$  W., and Tobacco point N.W. It is said that from its summit the Pyramid is shut in with the highest hill on the south side of the island, but this is doubtful.

*Anchorage.*—The anchorage is northward of the citadel, at a little westward of the N.E. point of Fernando Noronha. It is in a sort of open bay formed by the point and the islets off it, named the Platform and Cloven rocks, the former being connected to the N.E. point by a reef of rocks. The depth in the middle of the bay is 9 and 8 fathoms, which decreases rapidly to the shore until at the distance of a cable from it are only 12 feet. This place is too much exposed to allow vessels to remain long, the only shelter that is afforded being from the N.E.; and that protection is but trifling, as the Platform islet and the rocky reef connecting it to Fernando Noronha scarcely keep off the swell of the sea. It is usual to anchor outside or at the entrance to the bay, upon the meridian of the citadel, in a depth of 13 and 14 $\frac{1}{2}$  fathoms, as there, for the space of about half a mile, the bottom is of soft sand. Some marks that have been given for anchoring are, the Pyramid S.W. by S., and the citadel S. by E. distant about three-quarters of a mile.\*

The above anchorage cannot by any means be recommended, although there is reason to believe that it is the best about the island. It is dangerous in the months from December to April, at which time the prevailing winds are from North to N.W.; at other times of the year less risk is incurred, because the winds are then from S.E., East, and sometimes N.E.

The *climate* of the island, though humid, is very healthy. The dry season commences in July, and continues to December, when the rainy season succeeds, and lasts till July. From January to March, thunder and lightning are common; and the heavy surfs prevail, especially about Rat island, at the same period as those of Ascension and St. Helena, at which time the wind is light and variable from the north-west. In the dry season there is sometimes a very scanty supply of water, but in the wet season quite a deluge.

*Supplies &c.*—Water is obtained from a well near the house of the governor, and the getting it is attended with considerable difficulty, as the casks have to be floated to and from the boats in the midst of rocks by which they frequently get stove in. Wood may be procured from Rat island, as well as from Fernando Noronha, after permission to cut it has been obtained from the governor. Fernando Noronha is not very fertile, and although supplies of wood and water may be obtained, the latter is sometimes scarce. Cattle and sheep are raised on the

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\* When H.M.S. *Cambridge* was here in 1827, she anchored with Rat island bearing N.E. by E.  $\frac{1}{4}$  E.; mount St. Michael partly shut in by Platform island, E.  $\frac{1}{4}$  N.; and the citadel S.S.E. one mile. The Sugar-loaf hill then bore S.S.W., and two small high islands S.W. by W., at the same time shutting in the south-west extremity of the island.

Lieut. Lee, U.S. Navy, anchored here in 1852 in 16 fathoms water. The bearings taken were the northern Twin S. 60° W.; the Peak or Pyramid S 21° 30' W.; and mount St. Michael S. 85° E.

island, also poultry : and these, we believe, can be had in considerable quantities, as it was formerly a favourite rendezvous for vessels engaged in the whale fishery. East India ships have also occasionally touched here when carried to the westward of their proper course by the currents. At present it is visited by but few vessels in the merchant service, as it has been made a convict settlement for the criminals of Brazil. There is, we believe, a force of about 100 men stationed here, under command of a major, who is also the governor, and the judge of all offences committed on the island. The free population amounts, perhaps, to about 200, who reside in the before-mentioned village on the north side of the island.

Fernando Noronha was visited by Captain Henry Foster, R.N., in June, 1880, when in command of H.M.S. *Ophicleer*. The following interesting account of the island was drawn up by Mr. W. H. B. Webster, the surgeon of the ship.

"Fernando Noronha consists of three distinct and principal islands, one of which takes the distinguishing name assigned to the whole, the others being considered mere appendages. The larger island is used by the Brazilians as a place of transportation for criminals, as well as for the exile of political dependents. Rat island, the next in size, is about a mile square; Booby and Egg islands are small; and mount St. Michael is a mere rocky islet rising vertically from the sea.

The scenery of the large island, Fernando Noronha proper, is enchanting. The shore is scooped out by divers inlets, and embossed with green promontories, which are connected by circling beaches, where rippling waves chase each other over the silvery sands, and bathe the flowerets of the skirting woods. A fresh luxuriant verdure crowns the summits of the hills, blending its soft hue with the general contour of the island. A richness and variety of vegetation is seen everywhere, excepting on the colossal pyramid of naked rock, which, rising from the bosom of a grove, stands erect in barren ruggedness, towering majestically over the smiling and fruitful scenes around. It is a gigantic block, the summit being 800 feet above the level of the sea, and is an excellent mark for seamen. When traversing the woody dale of the island, it can be seen through the breaks, and over the summits of the trees, presenting a monument of grandeur and sublimity on which the eye might rest without satiety.

The scenery is all fertility and beauty. There are no romantic hills and dales, but everything is on a moderate scale, and pleasing to the eye. The vegetation is that of a thickly-wooded grove rather than of a dense forest, for it admits of a walk even through its most shaded parts. There is an inland lake, and one or two trifling brooks, but no permanent streams of any importance. In the wet seasons the island is one continued swamp and bog; while in the summer it is dry and arid, and occasionally altogether deficient of water.

The soil is a fine, rich loam, of a considerable depth, and has a reddish tinge. There is upland pasture for sheep, and rich plains for cultivation, besides little fairy vales, blooming in all the beauty of verdure. The sandy beaches in the tranquil bays are sweetly picturesque, especially in the evening; the sand is as smooth as a well-rolled path, and the gentle ripple of the waves scarcely disturbs the quietness which reigns around.

The vegetation is perpetual and vigorous. At the close of day it is most interesting to watch the plants folding up their leaves and drooping their heads, as if wearied by the fervent heat of the sun. I do not recollect ever having noticed the sleep of plants so distinctly as here, the change in the aspect of the

leaves is so very remarkable. The acacias were completely shut up, which in my opinion serves to increase the delicious fragrance of the flowers. The cassias were folding and reclining, the liquorice pea was indeed asleep, and the whole effect of the grove was totally altered from that when the sun was up. The most distinguishing feature in the vegetation is the abundance of climbing plants which block up the woods with their descending stems, and form a thicket in many parts of impenetrable brushwood.

The small village in Peak bay, on the north shore of the island, is built in the form of a square. The houses composing it are not worthy of note, but are sufficient for the place; most have gardens attached to them, and the governor has a farm at a short distance from the village, from whence his table is supplied.

At about a league from the village, in a S.E. direction towards Tobacco bay, are extensive fields of Indian corn and cotton, besides a plantation of cocoa-nuts and a tolerable garden. A brick and tile manufactory is also carried on there, but there are no limekilns.

The employment of the people consists principally in fishing, for which purpose they have a manufactory of cotton line. Agriculture is much neglected, the greater part of the island being in a state of nature; but such is the richness of the soil, that it would repay them well for any trouble they would bestow on it.

The process of drawing the seine is very interesting. This consists of a few long stems of a creeping convolvulus with the leaves on it, which are twisted together into a kind of mass or lump. Thus prepared, it is dragged into the water just within the break of the surf; and when a fish is seen within the scope of their leafy net, they drag it quickly ashore, with a view of entangling it among the leaves. This device is sometimes very successful. The cotton hand-nets that they also use are very neatly constructed, and with these they reap a much richer harvest. Whilst the operation of drawing the seine is going forward on the beach, some are occupied in angling from the rocks of the projecting points, and among them sufficient fish is caught for the provision of all the islanders. Groups of naked fellows may be seen seated on the beach, watching the operations of the fishermen; while the pelican is diving continually about the edge of the surf, and the <sup>fisher</sup> man-of-war bird over him, who, as the pelican rises with his prey, darts down on him with incredible rapidity, and makes him instantly disgorge it, when it is readily seized by this second plunderer.

The attempts of these islanders at navigation are confined to the *catamaran*, not a single boat being found throughout the whole island. All ideas of improvement on anything are foreign to their minds; the accoutrements of their horses are the same as those used more than a century back; and as for agriculture, they have no idea of it. The ground lies untilled before them, the earth smiles in vain, while they are ever lolling in their hammocks, smoking and gaming throughout the day, the very patterns of indolence and laziness. The evenings are passed in serenading to the notes of a guitar, or singing and revelling at some lascivious fandango. The only art for which Fernando is famous is that of rearing capons, which are of the finest description.

The island is supplied with flour and other provisions from Brazil; but the supplies are at times deficient. The cattle of the island are very fine; and an abundant supply of good young beef was obtained. The governor was exceedingly attentive, and sent off every morning sufficient milk for the men as well as officers. Vegetables were rather scarce, although they might be raised in any quantity. Rat island yields a profusion of fine melons. The water-melons are particularly so, and sometimes two feet long."

Captain Fitzroy, R.N., visited Fernando Noronha in February, 1832, for the purpose of rating his chronometers preparatory to the survey of the coast of Patagonia. He thus writes:—"we obtained some firewood from one of the islets northward of the principal island; but it was full of centipedes and other noxious insects, from which it was not easy to free it, even by charring and washing. Water we did not try to get, because of the heavy surf; but there is no scarcity of it on the island. Neither live-stock nor vegetables could be procured from the apathetic inhabitants.

This place is rather picturesque; and the lofty barren peak is conspicuous from every point of view. Near the summit is a station from which a look-out is kept, not only over all the island, but over many leagues of the surrounding sea; so that neither ship nor boat can approach or depart, during daylight, without being noticed.

No boats are allowed to be kept on the island, and no intercourse is held with shipping, without permission and the strictest inspection."

Mr. Kidder says of Fernando Noronha, in 1845,—“The island has been successively under the dominion of Portugal, Holland, France, and Brazil. Many little islets are divided from the principal island and from each other by narrow channels. They are all rocky and barren, although frequented by vast numbers of sea-fowl, and affording a favourable locality for fishing. There are two harbours, but neither of them is safe during a storm. Its appearance from a distance at sea, which I had an opportunity of observing during my outward voyage to Brazil, has been, with some propriety, likened to an immense church. The principal mountain peak serves as a steeple, and, as such, is sometimes called *Companario*. Nothing, however, is more dissimilar to the moral condition of this island than the idea of a church. It has for ages been occupied solely as a place of exile and imprisonment. Seven forts were erected upon it by the Portuguese, in the days of their wealth and power. A small garrison is always stationed at Fernando, for the purpose of keeping in subjection the malefactors confined upon that rocky and sea-girt prison. No woman is allowed to visit the island, and most of the provisions used upon it are carried from Pernambuco.”

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## THE ROCCAS.

**THE ROCCAS,\***—It is proposed to treat this reef under five heads, as follows:—I. A description of the Roccas. II. The position of the reef. III. The currents in the vicinity. IV. The winds; and V. Is the eastern, middle, or western route across the Equator the most advantageous, so as to be in the best position when the southern tropic is reached?

The **Roccas** was well known in the middle of the last century as a low dangerous reef, the vicinity of which was to be avoided on account of the strong westerly current prevailing there; notwithstanding which the Hon. E.I.C.'s ship *Britannia*

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\* From the *Mercantile Marine Magazine*, Vol. xiii. for (1866).

and the transport *King George* were wrecked on it in November 1805, and several other vessels of the fleet had a narrow escape; that wrecks had occurred previously is probable, though we have no account of them; later, several are known to have taken place, as wreckage and anchors have been found by recent surveyors. The barque *Countess of Zetland* was lost on it in October, 1855. The *E. D.* was wrecked there in October, 1856,—a description of the sufferings of a portion of the crew and of the death of the rest being published at the time; the captain and crew were a month on the north islet, and state "there was much old timber, and we could distinguish five different vessels: we also found several human skulls, and many bones were scattered about; vessels frequently passed the vicinity." The *Duncan Dunbar* is the last ill-fated vessel to be added to the catalogue of disasters.

#### I.—DESCRIPTION OF THE ROCCAS.

1. The first regular survey of the Roccas was made by Lieut. S. P. Lee, U.S. Navy, commanding the surveying brig *Dolphin*, in 1852,—his instructions specially notifying that the examination of cape San Roque, Las Roccas, and Fernando Noronha, with the soundings and currents in the vicinity, was to occupy his particular attention:—

"March 14th.—At 2h. 30m. p.m. large flocks of black gulls in sight, and a few minutes afterwards breakers (the Roccas) were reported from the topsail-yard, distant 10 miles. Hove-to and sounded; no bottom at 70 fathoms up and down. Filled away under easy sail and sounded during the afternoon. At 6h. p.m. anchored under the lee of the Roccas (Sand island bearing, per compass, E.S.E., distant  $1\frac{1}{2}$  miles), in 18 fathoms water, and veered to 90 fathoms on the stream chain and cable. Sounded round the vessel, in a boat, and found the bottom to be of flat coral, and the depth from 18 to 19 fathoms water.

"March 15th.—At 7 a.m. Lieutenant Commanding Lee, Mr. Elliot, and Mr. Renshaw, left for the reef. The boats sounded to and along the reef, which they examined, one on the northern, and the other on the western side, for a landing; but the sea everywhere broke badly, as if the rollers passed over jagged coral. Towards high water Mr. Renshaw found that it looked much smoother under the lee of Sand island, and afterwards, when both boats were there examining the reef, finding his boat already in the surf, pulled in and effected the first landing with ease and safety. When the tide went out and left the reef bare it appeared flat, showing many crevices and small openings, which had caused the rollers to break as though they were striking against pointed pieces of coral. Measured a base of 242 fathoms length on Sand island, made observations for time and azimuth, and took some horizontal angles and bearings. At sunset dragged the boats safely over the bare reef, and pulled without difficulty through the surf.

"March 16th.—In the morning, Lieutenant Commanding Lee, Mr. Barbot, Mr. Mayo, and Mr. Elliot, with a small party of seamen, landed on the Roccas, using the small metallic life-boat to cross on the reef, to prevent injury to the bottoms of the whale boats. Put up signals and determined the extent of the reef, and of the islands and prominent rocks. Took some astronomical and tidal observations, and returned on board at sunset. The current yesterday and to-day at our anchorage set from between S.S.E. and E. by S. from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  knot per hour. The commanding officer and several of the shore party affected by

ophthalmia, caused by the great glare of the sand islands and heat of a vertical sun.

"March 17th.—Squally and rainy. Got under way. Employed until the 28th in computing some of the observations, making a plan of the reef, and trying currents in its vicinity, ascertaining that there was no visible danger within 10 or 15 miles of the reef, and in endeavouring to determine the extent of soundings from the reef. Squally weather, baffling winds, calms and currents, prevented the full execution of this last object.

"The centre of this low and dangerous reef is 84 miles due W. of the peak of Fernando Noronha. The reef extends about  $1\frac{1}{2}$  miles in latitude, and nearly  $1\frac{1}{2}$  miles in longitude, and is covered at high water, with the exception of Sand and Grass islands on the west, and the scattered rocks on the south and east sides. These objects are from 10 to 15 feet above the reef, which is formed of coral, generally level, though with many holes in it. In case of a vessel striking on the weather (S.E.) side of it, the chance of saving life would be small. When about 10 miles off, the breakers were first seen from aloft; then the two low islands and the black rock soon appeared. Sea birds abound, but there is no guano, owing to the rains. The eggs of the gulls were plentiful and good. There is no wood or fresh water. There is bad anchorage from 1 to 2 miles N.W. of Sand island in from 15 to 18 fathoms, coral bottom. We found coral bottom at 15 fathoms, 6 miles east of the reef; but no bottom at 30 fathoms,  $2\frac{1}{2}$  miles N.N.E., nor at 70 fathoms, 4 miles S.W. of it.

"The tide rises about 5 feet. The lagoon, in which we saw many turtle, has from 1 to 4 feet at low tide, and shows white from the masthead at 4 or 5 miles distance. The anchors and cable on the S.W. part of the reef, and the remains of a wrecked vessel on the N.E. side of Grass island, appear to have been on the reef a long time. A lighthouse on this reef would be very useful to vessels.

"The current in the vicinity of this reef, sets from between S.E. by E. and E. by N., at the rate of from  $\frac{1}{2}$  to  $1\frac{1}{2}$  knots per hour, as found by the daily difference between our position by reckoning when running by the patent log, and that deduced from good astronomical observations. The surface current, found by trials on four different days, during the same period, sets from between S.E. and E. by N. from  $\frac{1}{2}$  to  $1\frac{1}{2}$  knots per hour. At our anchorage, under the lee of Sand island, the tide ran from  $\frac{1}{2}$  to  $\frac{3}{4}$  knot per hour, setting from between S.S.E. and E. by N. towards the northward and westward. The current observations, recorded on the 22nd in the abstract, were each the result of seven agreeing trials, with a gentle breeze (3) and smooth sea. On the 25th it was calm and the current observation was very good. On the 27th the sea was smooth and the wind light, when the current observations were made; but on the 28th the sea was rough and the wind moderate (4) which made the set of the current appear larger than it was."

2. The reef was again examined in March, 1856, by Commander Parish, R.N., and the following is a copy of his report:—

"On the 5th of March, 1856, I sighted the Roccas from the mast-head at 4h. 15m. p.m., bearing W.N.W., about 9 miles distant, at which time we had no bottom with 46 fathoms. I then bore up N.W. to close the group, and on sounding at 5h. p.m. obtained coral bottom in 13 fathoms, the rocks not being even then in sight from the deck. I therefore determined on remaining in that position during the night, and consequently anchored in 12 fathoms, the highest rock being then first visible from the deck, bearing West (*true*).

" At 6h. 40m. a.m. the next day I proceeded under steam to the N.W., giving the shore a berth of about 5 miles, until arriving on the N.W. side of the sandbanks, where I anchored in 20 fathoms, coral bottom, at about 2½ miles from the shore, with the following *magnetic* bearings (variation 10° W.):—Breakers, southern extreme, S. 15° E.; middle of sandbanks, S. 27° E.; highest rock of group, S. 42° E.; breakers, eastern extreme, S. 50° E.

Whilst describing the semicircle, our soundings were 13, 14 and 15 fathoms, until the group bore S. by E., when there was no bottom with 70 fathoms. From this it appears that the shoalest water exists on the eastern side. A careful attention to the deep-sea lead would alone betray to a vessel in doubt the vicinity of the shoal on approaching in that direction; when, if practicable, anchoring is a course strongly to be recommended, until daylight or clearer weather enables the master to ascertain his true position.

As the prevailing winds in that quarter will always enable a vessel bound North to choose a course either to the east or west of this shoal, I do not see that any master would be justified in endeavouring to sight the same; a proceeding which might be attended with considerable danger, and the benefits to be derived from which I am at a loss to conceive.

Having landed on the eastern sandbank, I caused a number of cocoa-nuts to be planted thereon, which were furnished me by H.M. Consul at Pernambuco, with the view of their forming, in time, distinct land-marks, which will enable the place to be discerned at a much further distance than is now possible.

The highest part of the bank may be set down at about 10 feet above high water mark. Rise and fall of tide, 7 feet. We found the current to set W.N.W. (*true*), between one and two miles per hour."

It appears probable, from the observations of Commander Parish, that a bank of soundings extends from the Roccas in a N.E. direction to the distance of about 5 miles. Upon this bank the depth obtained was 14 and 15 fathoms. It is strongly recommended to make a frequent use of the lead when approaching the reef, and to have an anchor and cable ready for letting go should occasion render it necessary.

3. The latest examination of the Roccas was made by Captain J. H. Selwyn, of the *Siren*, in November, 1857, and the following is the summary of results furnished to the U.S. Lighthouse Board by the U.S. Consul at Rio Janeiro, 1858:—"A survey has lately been made of the coral island lying off the coast of Brazil, named the Roccas.

"It is a perfect coral island, circular, about 2 miles in diameter, and has in its centre a shallow lake, with an opening to the sea. The greater part of the reef is under water. There are two sand-banks, one on the south-west side, and the other on the north-west side of the island. These are 10 or 12 feet above water at all tides, and are 200 or 300 yards long. The smaller has on it some stunted vegetation and hazel trees. A tower 33 feet high, has been erected on the larger bank, which can be seen in good weather a distance of about 11 miles. The island lies in a strong westwardly current, varying from one to two miles an hour."\*

The beacon here mentioned is stated to be no longer in existence (1865).

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\* This summary corresponds in the main, with the evidence of Captain Selwyn as given at the inquiry respecting the loss of the *Duncan Dunbar*, except so far as regards the current to which attention will be called in the sequel. We cannot help remarking that

4. In 1858, Captain H. Toynbee, passed close to the Roccas reef and his observations are worthy of note, for with his usual care, he appears to have taken no less than nine meridian altitudes for Latitude, and seven altitudes for time and Longitude, besides lunars, in the three days he was navigating between the Equator and Lat.  $5^{\circ} 37' S.$ , on his outward voyage.

"Throughout the afternoon (October 19th) we steered about  $S. 35^{\circ} W.$ , and at 5h. p.m. we saw the reef about twelve miles off, extending from nearly right ahead out on the weather bow; and at 6h. we kept away  $W.S.W.$ , so as to pass it at the distance of about five miles.

"The sighting the Roccas was one of very many instances in my experience proving the look-out man, either from want of practice or from want of feeling an interest in what he was doing, unable to see an object almost staring him in the face. From 3h. 30m. p.m. I ordered a regular look-out from fore-topsail-yard, at 5h. p.m. felt so sure that the reef must be in sight, that I determined to visit the topsail-yard myself; when on stepping into the rigging something strange caught my eye, which proved to be a beacon on the western part of the reef: yet from the topsail-yard the look-out man had seen nothing, and could hardly see it when I pointed it out. A similar case happened one evening on our way towards Torres straits, when I sent an officer up to look round as the sun set, though I always kept a man on the fore-topsail-yard. He quickly saw a long line of broken water right ahead, it being part of Lihou shoal extending further to the eastward than it was laid down either in charts or books. I find that in moderately clear weather, when observations show that the land may be sighted, a good night-glass on the fore-castle and a patent lead are first-rate safeguards; indeed the three L's are all right enough, but much depends on the quality of these said L's.

"From the fore-topsail-yard, with a first-rate Dollond, I examined the reef carefully. It reminded me of Wreck reef and others in Torres straits in the usual characteristics of a fringe of rocks sticking above water all round it, and lagoons of beautifully green water inside the fringe. There were loose pieces of rock lying in different parts, apparently thrown up by the sea, one larger than the rest on the eastern end of the reef: and on the western was the highest patch of sand: it was very white, though partly covered by something looking like brownish grass, and there was placed the beacon. I saw no signs of the cocoa-nut trees planted by Commander Parish, of H.M.S. *Sharpshooter*.

"From this bird's-eye view I think that the whole reef was fringed with rocks above water, with no passage even for a boat between the patches of sand. There were large numbers of birds settling on the island, and as the evening advanced we passed several which were steering a straight course for it. This, as has frequently been remarked before, is a capital sign for pointing out land, for the booby and some other sea birds will, if possible, find a resting-place for the night,

*Sula fusca*

this notice came through the United States, and we regret to be obliged to state that the Consuls of that nation appear, at all times and in all countries, to be more active than ours in obtaining and publishing information important to the Navigator; the result of Captain Selwyn's observations have not been officially published to this day. U.S. Consuls make a practice of communicating with surveying vessels, and forthwith announcing anything of importance; it would be well if British Consuls were equally active:—perhaps, however, the blame rests with the officials at home, who do not think it worth while to notice such matters.

even though it should only be a ship's yard-arm; when some mischievous boy is sure to disturb his dreams of which he makes everybody in the ship aware by his loud screaming as he is carelessly carried down the rigging by the neck.

"7h. P.M.—As we passed the reef, the white sand island on the western end bearing E. by S. at a distance of about five miles, we hove the lead and had no ground with 43 fathoms up and down. A plan of the reef would be very useful. There being a good moon and clear horizon, I found our position very frequently, in order to detect the first signs of a strong westerly current which some ships have experienced in this part of the sea." (*Naut. Mag.*, 1859.)

## II.—GEOGRAPHICAL POSITION OF THE ROCCAS REEF.

The coast of Brazil, originally surveyed by Baron Roussin of the French Navy, has recently (1859—1863) been examined and in part re-surveyed by Lieutenant Vital de Oliveira of the Brazilian Navy, and Captain E. Mouchez of the French I.N. The observations were made taking the fort of Villegagnon, Rio Janeiro, as the first meridian; consequently it became necessary to determine the position of Rio with respect to Paris. Now it is probable that there is no place on the South American continent the longitude of which has been more accurately measured by numerous independent observers—both English and French—besides which there is an observatory within the distance of a mile of the fort; from a comparison of all the determinations, Captain Mouchez arrived at the conclusion that fort Villegagnon is in long.  $45^{\circ} 27' W.$  of Paris, or  $43^{\circ} 6' 51'' W.$  of Greenwich, which agrees within a third of a minute ( $20''$ ) of longitude with the position assigned it by Captain Bedford, acting chief Hydrographer to the British Admiralty in 1864, and which was also the result of the correlation of the longitudes on the east and west coasts of South America.

On this basis the fort of San Marcello, Bahia, is in long.  $38^{\circ} 28' 29'' W.$  And fort Picao, Pernambuco, in long.  $34^{\circ} 49' 28'' W.$ ;—Raper, in his Maritime Positions, making the latter in  $34^{\circ} 51' 7'' W.$

Thence proceeding to the Long. of Fernando Noronha:—from a meridian distance measured between it and Pernambuco in a run of 7 days by M. Lartigue, surveying officer under Baron Roussin,—a meridian distance between it and Bahia by the late Admiral Fitzroy,—two meridian distances between it and Pernambuco in a run of 8 and 4 days respectively, by Lieutenant Lee, of the U.S. brig *Dolphin*,—and an independent admeasurement by Foster—the Long. of the Pyramid at Fernando Noronha is  $32^{\circ} 22' 43'' W.$ ; and of the Citadel  $32^{\circ} 22' 10'' W.$

In December, 1825, M. Lartigue made the Roccas in lat.  $3^{\circ} 55' S.$ ; and the meridian distance—sea horizon—between Fernando Noronha and the reef 5m. 146s., which, using Raper's Long. of the Peak of Fernando Noronha (viz.  $82^{\circ} 25' 5'' W.$ ) gives Long. of the Roccas  $33^{\circ} 44' W.$ , as in Raper's "Maritime Positions"; but corrected for the new determination  $33^{\circ} 42' W.$

But the French Hydrographers reject the above, and take the observations of Lieutenant Lee, who gives the Diff. Long. between the Citadel of Fernando

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\* For a complete list of Positions on the East Coast of South America, see Appendix of this Work, and also the *Mer. Mar. Mag.* Vol. xii (1865) p. 79-83.

Noronha and station, N. end of Sand island, Roccas = 5m. 39' 8s. ; whence we have—

Citadel, Fernando Noronha .....	32° 22' 10" W.
5m. 39' 8s .....	1 24 57 W.
Long. of N. end of Sand island ...	83 47 7 W.
Centre of reef, E. of above position	27 E.
Long. of Centre of Roccas reef * ...	83 46 40 W.

From three meridian and six circum-meridian altitudes of sun, and two meridian altitudes of moon by three observers—greatest diff. 19" of arc—Lieutenant Lee made the lat. of N. end of Sand island 3° 50' 56" S. : centre of reef + 31" S. = lat. 3° 51' 27" S.

Commander J. E. Parish, of H.M.S. *Sharpshooter*, March, 1856, from sights taken on board and on shore, places the centre of Grass island, Roccas—which is as near as possible half a mile due South of Lieutenant Lee's station on Sand island—in lat. 3° 51' 25" S., long. 83° 46' 33" W. ;—a position which singularly coincides with Lee's determination as given above.

Captain Selwyn, of H.M.S. *Siren*, November 1857, places the Roccas—exact part of the reef not stated—in lat. 3° 51' 30" S., long. 83° 50' 9" W. ; he does not say whether the longitude is given by meridian distance measured from a Brazilian port,—but by applying the correction 2' 17" E., the long. becomes 83° 47' 52" W. †

Thus, then, the true position of the centre of the Roccas reef may be taken as—

Latitude 3° 51' 30" S.

Longitude 83° 46' 30" W.

84 miles W.  $\frac{1}{4}$  N. from the peak of Fernando Noronha ; 129 miles E.N.E.  $\frac{1}{4}$  N. from Touro, at the N.E. extremity of Brazil ; and 132 miles N.E.  $\frac{3}{4}$  E. from cape San Roque. (*Bearings Magnetic—Variation 10° W.*)

High water at F. and C. at the Roccas at 5h. 15m. The flats off cape San Roque, extend 10 miles off the coast due north from Touro, to 5 miles off the coast east of cape San Roque.

The mean direction of the current according to Lieutenant Lee's observations is N. 77° W. 1.2 mile per hour.

### III.—CURRENTS IN THE VICINITY OF THE ROCCAS REEF.

It was given in evidence by Captain Selwyn at the inquiry into the loss of the *Duncan Dunbar* that—"in making the survey (of the Roccas) I examined the books usually found on board a man-of-war, describing the currents ; I found

\* Lieutenant Lee used Raper's determination of port Picao and gives the Long. of the N. end of Sand island 83° 49' 24" W., and of the centre of the reef 83° 48' 57" W., the diff. between the old and new position assigned to port Picao is 2' 17".

† From the pertinacity with which Captain Selwyn as a witness in the *Duncan Dunbar* inquiry spoke, and has since written of his observations—we presume the station he selected was the same as that adopted by Lieutenant Lee, for he connects the two series of observations together as if relating to the same spot.

them described as strong westerly currents; I tested the truth of this description myself and established the opposite fact. The currents, instead of setting to the westward during the month of November that I was there, set strongly to the southward in the immediate vicinity of the rock. I tested it 10 or 15 miles north and west of the island and found it took a *southerly direction, with a tendency towards the east.*" In a correspondence that subsequently ensued the southerly current is continually spoken of, but without reference to easting or westing.

Now, the question to be answered is—*What direction do the currents take in the vicinity of the Roccas?*—north, south, east, and west of that reef—but especially to the north of it?—and our task would have been comparatively short and easy had not Captain Trivett in a letter on the subject introduced the observations made on board the Hon. Hudson's Bay Co. ship *Princess Royal* on nine outward and homeward passages, which has necessitated the production of observations made on board *other* vessels of the Mercantile Marine. But here we cannot refrain from remarking that the log-book on board merchant vessels is *very rarely* kept with the precision due to a record supposed to have a scientific value; and consequently the currents, deduced from the difference between Obs. and D.R., must partake of the errors of the documents whence they are derived; indeed, it is probably not going too far to say that *no* vessels, except those especially equipped for surveying purposes, can correctly determine the currents in the region of variables, for, where calms, light airs, and strong puffs alternately prevail, the rate of a vessel's progress through the water, independently of her having at times no steerage way, can be but imperfectly recorded; \* the ordinary log and reel, under such circumstances is not more valuable than guessing the distance run on each course; but the *patent log*—which is not often found on board our merchant sailing ships—would be of essential service; Lieutenant Lee in his survey of the Roccas has these remarks on the subject,—“the reckoning was carefully made up at noon from the run both by patent log and common log. The daily difference was sometimes as much as 11 miles, though the judgment of the officer of the deck (who always hove the log) was insensibly influenced by habitual comparison with the patent log. The average daily difference was 3 or 4 miles. The patent log sometimes showed least, but generally most run; agreed closest with the measurements by astronomical observations, and was always adopted. More attention should be paid to this important instrument;” and Captain Toynbee in one of his papers bears similar testimony to the value of this instrument.

We now proceed to give the records; and shall then close this part of our subject with a *general summary*—on the currents in the middle and on the western side of the Atlantic Ocean between lat. 15° N. and 20° S.—*especially referring to the vicinity of the Roccas.*

In the first place we give the observations of Lieutenant Lee, because they

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\* The correctness of this assertion cannot be better illustrated than by the following record:—The vessels of the U.S. Exploring Expedition sailed from Porto Praya in October, all crossed the line near the same spot and all were bound for Rio, yet “the set by current of the squadron from Porto Praya to the Line, in 24 days, was N. 25° E. 132 miles; the *Peacock* experienced it N. 56° E. 144 miles in 23 days; and the *Relief* N. 48° E. 203 miles in 25 days.” The N.E. Trade-wind was lost in 12½° N. and 24° W. —after which the winds prevailed from S.S.W. to S.S.E., generally light, inclining to calm.

are the most important—as being connected with the survey of the vicinity of the Roccas.

In the progress of his surveying voyage he arrived, February 19th, in Lat.  $1^{\circ} 42' S.$ , Long.  $21^{\circ} 30' W.$ ; thence to Lat.  $3^{\circ} 36' S.$ , Long.  $31^{\circ} 45' W.$  (his position February 23rd), the surface current, by ship's reckoning had set between N.  $76^{\circ} W.$  and N.  $83^{\circ} W.$  at the mean rate of 1.3 knots per hour,—by observations from boat, between West and N.W. by W. at the mean rate of 1.2 knots,—the under current at the depth of 10 fathoms setting West to N.W. by W. 1.4 knots.

The winds recorded are,—S. once; S. by E. 6 times; S.S.E. 9 times; S.E. by S. once; and S.E. by E. twice.

From February 24th to 27th, the *Dolphin* was anchored at Fernando Noronha, and from 17 observations on the wind, S.E. is recorded 7 times, and E.S.E. 3 times; the remainder being *equally divided* between those from southerly and more easterly. "Observed by heaving the log hourly that the greatest set of tide in the roadstead was  $\frac{1}{6}$  of a knot westerly."

February 28th, in Lat.  $4^{\circ} 35' S.$ , Long.  $32^{\circ} 44' W.$ ; the surface current (from boat) was W. by N. 1.2 knots, the under current the same.

March 1st, in Lat.  $8^{\circ} S.$ , Long.  $34^{\circ} 25' W.$ ; surface current (from boat) S.S.W. 0.6 knot, the under current S.S.E. 0.7 knot.

The winds in the three days had varied from S.E. to E. by S.

From March 2nd to 7th, at anchor in Pernambuco roads,—the wind during the stay being from S.E. to E.S.E.

March 8th.—Lat.  $7^{\circ} 14' S.$ , Long.  $34^{\circ} 17' W.$ ; surface current N.  $55^{\circ} W.$  0.6 knot; wind S.E. to E.S.E.

March 9th.—Lat.  $6^{\circ} 15\frac{1}{2}' S.$ , Long.  $33^{\circ} 24' W.$ ; surface current N.W. by N. 0.3 knot; under current the same; wind S.E.

March 10th.—Lat.  $4^{\circ} 35' S.$ , Long.  $32^{\circ} 28' W.$ ; surface current West, 1.1 knots; under current S.W. by W. 1 knot; wind S.E. by S. to S.E. by E. at 3 p.m. in Lat.  $4^{\circ} 43\frac{1}{4}' S.$ , Long.  $32^{\circ} 48' W.$ , no bottom with 1250 fathoms of line.

March 11th.—Lat.  $3^{\circ} 56\frac{1}{2}' S.$ , Long.  $32^{\circ} 19' W.$ ; surface current West, 1.3 knots; wind S.E. and S.E. by E.

March 12th.—At anchor at Fernando Noronha; wind S.S.E. to E.S.E.

March 18th.—Lat.  $3^{\circ} 51\frac{1}{2}' S.$ , Long.  $33^{\circ} 2\frac{1}{4}' W.$ ; surface current N.W. 0.5 knots; under current W.N.W. 0.5 knot; wind S.E. by E.; bottom at 2150 fathoms.

March 14th.—Lat.  $3^{\circ} 35\frac{1}{4}' S.$ , Long.  $33^{\circ} 26\frac{1}{4}' W.$ ; surface current N.  $60^{\circ} W.$  1 knot; wind S.E.

March 15th.—At anchor off Las Roccas; wind S.E. by S. to E.S.E.

March 16th.—At anchor; wind S.S.E. to E.S.E.

March 17th.—Lat.  $3^{\circ} 53' S.$ , Long.  $33^{\circ} 52' W.$ ; winds S.E. to E. by S.

March 18th.—Lat.  $3^{\circ} 51' S.$ , Long.  $33^{\circ} 56' W.$ ; surface current S.  $85^{\circ} W.$  1.5 knots; wind E.S.E.

March 19th.—Lat.  $3^{\circ} 24\frac{1}{4}' S.$ , Long.  $33^{\circ} 49\frac{1}{4}' W.$ ; surface current S.  $78^{\circ} W.$  1.5 knots; winds S.E. to E.S.E.

March 20th.—Lat.  $2^{\circ} 46\frac{1}{4}' S.$ , Long.  $33^{\circ} 22' W.$ ; surface current S.  $78^{\circ} W.$  1.5 knots; winds S.E. by S. to E. by S.

March 21st.—Lat.  $3^{\circ} 28\frac{1}{4}' S.$ , Long.  $33^{\circ} 18' W.$ ; surface current N.  $84^{\circ} W.$  1 knot; winds S.E. to E. by N.

March 22nd.—Lat.  $3^{\circ} 30\frac{1}{2}'$  S., Long.  $83^{\circ} 31'$  W.; surface current W. by N.  $1\frac{1}{4}$  knots; under current W. by N.  $1\frac{1}{4}$  knots; no bottom at 1000 fathoms! wind S.E.

March 23rd.—Lat.  $3^{\circ} 30'$  S., Long.  $83^{\circ} 48\frac{1}{2}'$  W.; surface current N.  $75^{\circ}$  W.  $1\frac{1}{3}$  knots.

March 24th.—Lat.  $3^{\circ} 46'$  S., Long.  $83^{\circ} 42\frac{1}{2}'$  W.; surface current N.  $71^{\circ}$  W.  $0\cdot9$  knot.

March 25th.—Lat.  $4^{\circ} 0\frac{1}{2}'$  S., Long.  $83^{\circ} 40\frac{1}{2}'$  W.; surface current W. by N.  $1\cdot1$  knots; no bottom at 1000 fathoms.

March 26th.—Lat.  $3^{\circ} 59'$  S., Long.  $83^{\circ} 58'$  W.; surface current N.  $75^{\circ}$  W.  $1\cdot2$  knots.

March 27th.—Lat.  $3^{\circ} 49'$  S., Long.  $83^{\circ} 52\frac{1}{2}'$  W.; surface current N.W.  $0\cdot9$  knot; under current N.W.  $1$  knot; no bottom at 500 fathoms.

March 28th.—Lat.  $4^{\circ} 11\frac{1}{2}'$  S., Long.  $84^{\circ} 38'$  W.; surface current N.  $50^{\circ}$  W.  $1$  knot; under current N.W.  $1\frac{1}{4}$  knots.

March 29th.—Lat.  $4^{\circ} 30'$  S., Long.  $85^{\circ} 3'$  W.; surface current N.  $61^{\circ}$  W.  $1\cdot3$  knots; thence the route was along the north coast of Brazil.

[Seven of these observations, viz., March 19th, 20th, 21st, 22nd, 23rd, 24th, and 27th were immediately to northward of Las Roccas, and give the mean direction of the surface current N.  $80^{\circ}$  W.: the subsequent observations to south and west of the reef give a surface current of N.  $68^{\circ}$  W.]

March 30th.—6h. a.m.; Lat.  $4^{\circ} 26'$  S., Long.  $25^{\circ} 9'$  W.; surface current (by boat) South,  $2$  knots; no bottom at 1000 fathoms; noon, Lat.  $4^{\circ} 21\frac{1}{2}'$  S., Long.  $35^{\circ} 17'$  W.; surface current N.  $88^{\circ}$  W.  $1\cdot7$  knots.

March 31st.—Lat.  $4^{\circ} 17'$  S., Long.  $35^{\circ} 19\frac{1}{2}'$  W.; surface current N.  $77^{\circ}$  W.  $0\cdot9$  knot; at 3 p.m. Lat.  $4^{\circ} 17\frac{1}{2}'$  S., Long.  $35^{\circ} 20\frac{1}{2}'$  W.; surface current (by boat) S.E.  $1\frac{1}{4}$  knots; under current S.E.  $1\cdot2$  knots; no bottom at 1000 fathoms.

April 1st.—Lat.  $3^{\circ} 34\frac{1}{2}'$  S., Long.  $35^{\circ} 38\frac{1}{2}'$  W.; surface current N.  $67^{\circ}$  W.  $0\cdot8$  knot; at 3 p.m. Lat.  $3^{\circ} 18'$  S., Long.  $35^{\circ} 45'$  W.; surface current (by boat) W. by S.  $0\cdot9$  knot.

April 2nd.—6 a.m. Lat.  $2^{\circ} 38'$  S.; Long.  $36^{\circ} 36\frac{1}{2}'$  W.; surface current (by boat) W.N.W.  $1$  knot; under current N.W.;—noon, Lat.  $2^{\circ} 27'$  S., Long.  $36^{\circ} 46'$  W.; surface current S.  $87^{\circ}$  W.  $1$  knot.

The remarks for March 30th are:—"The difference between the observations (which were many and good) and reckoning, which was necessarily uncertain in such weather, showed a current of  $1\frac{1}{4}$  knots per hour, setting West; if the observations made in the boat were correct, we were probably in an eddy, or influenced by tide;\* the brig's position at this time was about 25 miles N.E. of bottom at 25 fathoms on the flats of San Roque."

The remarks for March 31st are:—"The surface current from five agreeing trials set S.E.  $\frac{1}{4}$  S.; when these observations were made the sea was glassy smooth, with a long swell from N.N.E.; the reckoning and observations to-day show a current of  $1$  knot per hour Westerly, whilst the drift of the brig from the sounding boat and current observations of the boat indicate a considerable current to southward.

"We were three days within from 20 to 30 miles north of the flats of San Roque, off cape Touro; the current between the Roccas and the main sets generally from the Southward and Eastward, from  $1$  to  $1\frac{1}{4}$  knots, until near the flats, where we experienced indications of a counter current or tide."

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\* The flood sets to the westward, the ebb to the eastward.

From the log. of the Honourable Hudson's Bay Co.'s ship *Princess Royal* :—

Sept. 28th, 1856.—Lat.  $3^{\circ} 43'$  S., Long.  $29^{\circ} 21'$  W.; current S.  $55^{\circ}$  W. 9 miles (Captain Trivett).

May 31st, 1857.—Lat.  $1^{\circ} 56'$  S., Long.  $30^{\circ} 59'$  W.; current N.  $70^{\circ}$  W. 27 miles (Captain Trivett).

October 21st, 1857.—Lat.  $4^{\circ} 18'$  S., Long.  $32^{\circ} 58'$  W.; current none (Captain Trivett).

July 3rd, 1858.—Lat.  $3^{\circ} 10'$  S., Long.  $26^{\circ} 29'$  W.; current S.  $55^{\circ}$  W. 23 miles (Captain Trivett).

October 26th, 1858.—Lat.  $3^{\circ} 47'$  S., Long.  $32^{\circ} 46'$  W.; current S.  $38^{\circ}$  W. 34 miles (Captain Sinclair).

June 19th, 1859.—Lat.  $3^{\circ} 46'$  S., Long.  $32^{\circ} 28'$  W.; current S.  $54^{\circ}$  W. 44 miles (Captain Sinclair).

June 20th, 1859.—Lat.  $1^{\circ} 21'$  S., Long.  $33^{\circ} 8'$  W.; current S.  $47^{\circ}$  W. 23 miles (Captain Sinclair).

Nov. 10th, 1859.—Lat.  $3^{\circ} 42'$  S., Long.  $33^{\circ} 6'$  W.; current N.  $78^{\circ}$  W. 16 miles (Captain Trivett).

June 7th, 1860.—Lat.  $1^{\circ} 8'$  S., Long.  $29^{\circ} 1'$  W.; current S.  $14^{\circ}$  W. 12 miles (Captain Trivett).

October 21st, 1860.—Lat.  $3^{\circ} 15'$  S., Long.  $29^{\circ} 46'$  W.; current S.  $50^{\circ}$  E. 8 miles (Captain Trivett).

May 24th, 1861.—Lat.  $4^{\circ} 49'$  S., Long.  $33^{\circ} 42'$  W.; current N.  $74^{\circ}$  W. 11 miles (Captain Trivett).

May 25th, 1861.—Lat.  $1^{\circ} 41'$  S., Long.  $34^{\circ} 20'$  W.; current S. 9 miles (Captain Trivett).

October 18th, 1861.—Lat.  $4^{\circ} 44'$  S., Long.  $30^{\circ} 47'$  W.; current S.  $11^{\circ}$  W. 4 miles (Captain Kingcome).

May 26th, 1862.—Lat.  $3^{\circ} 9'$  S., Long.  $31^{\circ} 14'$  W.; current N.  $37^{\circ}$  W. 6 miles (Captain Kingcome).

October 14th, 1862.—Lat.  $3^{\circ} 45'$  S., Long.  $33^{\circ} 53'$  W.; current S.  $54^{\circ}$  W. 24 miles (Captain Kingcome).

May 13th, 1863.—Lat.  $2^{\circ} 47'$  S., Long.  $32^{\circ} 9'$  W.; current N.  $79^{\circ}$  W. 37 miles (Captain Kingcome).

October 15th, 1863.—Lat.  $2^{\circ} 14'$  S., Long.  $30^{\circ} 22'$  W.; current S.  $12^{\circ}$  E. 19 miles (Captain Kingcome).

October 16th, 1863.—Lat.  $4^{\circ} 45'$  S., Long.  $31^{\circ} 13'$  W.; current N.  $16^{\circ}$  E. 14 miles (Captain Kingcome).

May 23rd, 1864.—Lat.  $4^{\circ} 6'$  S., Long.  $28^{\circ} 45'$  W.; current S.  $74^{\circ}$  W. 39 miles (Captain Kingcome).

May 24th, 1864.—Lat.  $1^{\circ} 1'$  S., Long.  $28^{\circ} 45'$  W.; current N.  $74^{\circ}$  W. 37 miles (Captain Kingcome).

October 27th, 1864.—Lat.  $4^{\circ} 0'$  S., Long.  $30^{\circ} 54'$  W.; current W. 6.6 miles (Captain Marshall).

May 28th, 1865.—Lat.  $4^{\circ} 45'$  S., Long.  $27^{\circ} 16'$  W.; current N.  $41^{\circ}$  W. 20 miles (Captain Marshall).

May 29th, 1865.—Lat.  $1^{\circ} 31'$  S., Long.  $27^{\circ} 19'$  W.; current W. 23 miles (Captain Kingcome).

The U.S. Exploring Expedition, under Captain Wilkes, spent a fortnight in the vicinity of the Equator (October-November, 1838), searching for reported shoals, after which it sailed for Rio. "From the Equator to Lat.  $3^{\circ}$  S., the set

by the Equatorial stream was S. 69° W. 75 miles; while from Lat. 3° S., Long. 20° W. to Lat. 13° S., Long. 30° W. its set was N. 80° W. 100 miles; thence to the latitude of Cape Frio it was to the southward and westward. The greatest set we experienced between Lat. 10° N. and 13° S. was on the meridian of 26° 30' W., 30 miles a day, nearly West.

Extract from the log. of the ship *True Briton*, Captain Edward A. Reynell.

"November 12th, 1856.—At 11h. 30m. a.m., sighted the Roccas, bearing N.E. by E. At 1h. p.m., the island then bearing E. by S., distant about 7 miles, made out two ensigns flying from separate flagstuffs; feeling uncertain whether it was a fishing station or people in distress, close-hauled the ship that we might near it as much as possible. At 2h., tacked to the southward, intending to work the ship as close in as could be done with safety, and then send a boat on shore to ascertain the truth; but finding that instead of nearing the bank we were, in consequence of the strength of the current, constantly increasing our distance from it, I determined to send the boat away at once. At 2h. 15m. sent the cutter with five hands, provided with water, food, blue lights, &c., in charge of the chief officer, with directions to reach the shore, if practicable, and to bring off any distressed people there might be there. During the boat's absence I continued to work the ship to windward, but lost ground so fast that at 5h. 30m. the bank was not visible from the poop deck. At 5h. 45m. the boat returned without having accomplished a landing, the chief officer stating that they had been as far as within 2½ miles of the shore, but that finding night was coming on, that the ship in consequence of the current was nearly hull down, and being apprehensive that if they continued to pull towards the land they would be unable to reach the ship again, he had deemed it necessary to return. At 6h. p.m. the bank was barely visible from the mizen-top, and finding it impossible to contend against the strength of the current, the captain was reluctantly compelled to abandon all hopes of communicating with the shore.

"November 13th.—Find that the ship during the last twenty-four hours has been set to the westward 60 miles.

"November 14th.—Find that the ship has been set to the westward 36 miles during the last twenty-four hours."

Captain H. Toyne's observations in 1858 are as follows:—

October 18th.—Lat. 0° 52' S., Long. 31° 24' W.; current S. 44° W. 12 miles.

October 19th.—Lat. 3° 15' S., Long. 31° 56' W.; current S. 13° W. 8 miles.

October 20th, Lat. 5° 37' S., Long. 34° 38' W.; current N. 57° W. 7½ miles.

October 21st.—Lat. 6° 36' S., Long. 34° 41' W.; current S. 64° W. 18 miles.

October 22nd.—Lat. 7° 28' S., Long. 34° 11' W.; current N. 16° W. 7½ miles.

Captain L. Saabye, of the *Benjamin Howard*, 1856.

December 10th.—Lat. 1° 45' N., Long. 24° 8' W.; current W.N.W. 0·8 mile per hour.

December 11th.—Lat. 0 59' S., Long. 26° 37' W.; current N.W. 0·6 mile per hour.

December 12th.—Lat. 3° 55' S., Long. 29° 57' W.; current W. 4 S. ½·5 miles per hour.

December 13th.—Lat. 7° 2' S., Long. 31° 10' W.; current S.W. by W. 0·7 mile per hour.

December 14th.—Lat. 10° 24' S., Long. 31° 22' W.; current S.W. by W. 0·7 mile per hour.

Captain Overton of the *Nagpore*, December 10th, 1863, crossed the Equator in

Long.  $80^{\circ} 30'$  W., *intending to pass well to windward of Fernando Noronha*. The U.S. man-of-war *Vanderbilt*, had been hove-to for a week or more to the southward of the Equator on the look out for Confederate 'cruisers; at 10 p.m. the second lieutenant boarded the *Nagpore*, and informed Captain Overton that the current for several days had been running strong to the N.W.-ward, and that he would scarcely weather the island.

December 11th.—Lat.  $3^{\circ} 15'$  S., and at 3 p.m. made out Fernando Noronha, which he just weathered, having been carried more to the N.W. than he had anticipated,—but in accordance with the information obtained from the *Vanderbilt*.

Captain Sir J. C. Ross on his Voyage of Discovery in the southern and Antarctic Regions crossed the Equator, December 3rd, 1839, in Long.  $30^{\circ}$  W. and remarks that—in crossing the Equator, Long.  $26^{\circ}$  or  $27^{\circ}$  W. is preferred, for the strong westerly current is liable to carry ships too near the coast of Brazil; the current diminishes in strength to the southward, and in Lat.  $8^{\circ}$  or  $9^{\circ}$  S. gives place to a feeble northerly set.

Captain R. Liddell, of the *Bride*, passed the Roccas in 1857, and the following are extracts from his log:—

January 9th.—Lat.  $0^{\circ} 14'$  N., Long.  $32^{\circ} 15'$  W.; current in the last 24 hours S.  $18^{\circ}$  W. 9 miles.

January 10th.—Lat.  $1^{\circ} 28\frac{1}{2}'$  S., Long.  $33^{\circ} 38'$  W.; current N.  $82^{\circ}$  W. 22 miles.

January 11th.—Lat.  $3^{\circ} 49'$  S., Long.  $33^{\circ} 47'$  W.; current S.  $84^{\circ}$  W. 8 miles: at 1h. p.m. passed the Roccas, being by D.R. 5 or 6 miles to leeward of it.

January 12th.—Lat.  $6^{\circ} 9'$  S., Long.  $33^{\circ} 59'$  W.; current S.  $15^{\circ}$  W. 23 miles.

Thence to January 15th.—Lat.  $13^{\circ} 16'$  S., Long.  $34^{\circ} 30'$  W.; the current was south 55 miles during the three days; and the wind since crossing the Equator varying from S.E. to S.E. by E.

Steamship *W. S. Lindsay*, Captain W. W. Palmer, 1857:—

February 1st.—Lat.  $0^{\circ} 5'$  N., Long.  $28^{\circ} 45'$  W.; no current.

February 2nd.—Lat.  $2^{\circ} 32'$  S., Long.  $29^{\circ} 2'$  W.; no current.

February 3rd.—Lat.  $5^{\circ} 30'$  S., Long.  $30^{\circ} 22'$  W.; current S.  $48^{\circ}$  W. 18 miles.

February 4th.—Lat.  $8^{\circ} 14'$  S., Long.  $32^{\circ} 1'$  W.; current S.  $61^{\circ}$  W. 13 miles.

February 5th.—Lat.  $11^{\circ} 4'$  S., Long.  $33^{\circ} 20'$  W.; current S.  $43^{\circ}$  W. 15 miles.

Captain L. Saabye, of the Danish ship *Benjamin Howard* in 1858, states:—

February 28th.—Lat.  $1^{\circ} 32'$  N., Long.  $28^{\circ} 36'$  W.; current W. by S. 1 mile per hour.

March 2nd.—Lat.  $3^{\circ} 10'$  S., Long.  $30^{\circ} 7'$  W.; current W.S.W. 1 mile per hour.

March 3rd.—Lat.  $6^{\circ} 32'$  S., Long.  $30^{\circ} 54'$  W.; current S.W.  $\frac{1}{4}$  of a mile per hour.

March 4th.—Lat.  $10^{\circ} 4'$  S., Long.  $31^{\circ} 36'$  W.; current S.W. by W. near 1 mile per hour.

The French transport *Bonite*, Captain Jouan, bound for New Caledonia in 1860, states that the current when approaching the Equator, as determined by the difference between D.R. and astronomical observations, was not perceptible, except from February 29th to March 1st, Lat.  $8^{\circ} 12'$  N., Long.  $24^{\circ}$  W., when it set S.  $69^{\circ}$  W. 14 miles. To the south of the Equator the winds were E.S.E. and East, fresh; and by keeping clear full no nearer approach was made to the coast of Brazil than 70 leagues. The greatest strength of current was observed 80 leagues E.N.E. of Fernando Noronha when it set S.W. 33 miles in the 24 hours; thence to Trinidad it set S.W. and South, 13 to 14 miles.

Captain F. Mitchell, of the *Queen of Nations*, writes,—February 20th, 1863, lost the S.E. trade wind in Lat.  $1^{\circ} 20'$  S., Long.  $22^{\circ}$  W.; had light variable airs

for three days, which carried us to Lat.  $0^{\circ} 29' N.$ , Long.  $22^{\circ} 10' W.$ ; no wind from that time until March 5th, in which interval the vessel drifted to Long.  $28^{\circ} 40' W.$  on the Equator,—a distance of 391 miles, giving a current setting S.  $86^{\circ} W.$ : here we got the N.E. Trades.

The French steam frigate *Sibylle*, Captain Pouget, in April, 1862, crossed the Equator in Long.  $31^{\circ} 10' W.$ , and thence to windward of Fernando Noronha; from Lat.  $5^{\circ} N.$  to the parallel of Parahiba, the set of the current was successively S.W.—S.S.W.—W.S.W. (off Fernando Noronha,)—and then West; approaching  $10^{\circ} S.$  it became more southerly.

H.M.S. *Sapphire*, on a cruise on and near the Equator, found the current setting W.S.W. to W.N.W., but much weaker in Long.  $37^{\circ} W.$  than in  $43^{\circ} W.$ , and strongest when near the land. In April, 1815, H.M.S. *Leonidas* found the current setting in the same direction from 28 to 50 miles per day, near Long.  $40^{\circ} W.$ , and south of the Equator. H.M.S. *Inconstant*, April, 1814, was set N.  $73^{\circ} W.$  47 miles in 24 hours in Long.  $38^{\circ} W.$  near the Equator.

Captain L. Saabye, of the *Benjamin Howard*, in July, 1856, states that from Lat.  $7^{\circ} S.$  Long.  $27^{\circ} W.$ , to Lat.  $2^{\circ} S.$  Long.  $24^{\circ} W.$ , the current was S.W.  $\frac{1}{2}$  a mile per hour; thence to Lat.  $2^{\circ} N.$  a drain of current to the S.E.-ward.

The French ship *Saint Michel*, Captain Fradin, "crossed the Equator (July 31st, 1862), in Long.  $29^{\circ} 45' W.$ ,—the wind being from S. to S.S.E.

"August 2nd, with the same winds, equally weather, and a moderately high sea, we had Fernando Noronha in sight to the S.E.; our position at noon was Lat.  $3^{\circ} 29' S.$ , Long.  $32^{\circ} 10' W.$ , and at 8h. p.m. about midway between that island and Las Roccas. From this position I began to fear I should not double cape San Roque, though well to windward of Las Roccas; I decided, however, to keep my course until I sighted the coast of Brazil, for the chopping sea, with the crests of the waves breaking against the wind, led me to conjecture that the current set to windward,—and thus contrary to what is stated in my directions. I was confirmed in this opinion when, being still on the same tack, at noon, August 3rd, our position was Lat.  $5^{\circ} 34' S.$ , Long.  $33^{\circ} 37' W.$ , and no land in sight; nor was it till the next day at noon, in Lat.  $6^{\circ} 58' S.$ , that we saw land, being then well to windward of cape San Roque."

We shall return to Captain Fradin's observations in connection with the winds, &c., but it is to be regretted that he has not said something on the current between the Equator and Fernando Noronha.

Major Rennell says:—"Experience most fully proves, that although nature effects all her operations in such a manner as that, ultimately, the whole system is balanced and preserved, yet that, in detail, she often appears irregular, according to our limited comprehension. The trade winds and the currents of the ocean partake of these irregularities, although the general system is upheld. The trade winds in the Atlantic are often unsteady, even to  $5^{\circ}$  or  $6^{\circ}$  within their northern boundary; and instead of N.E. winds, there are found N.W., and even S.W. winds for many days consecutively; and this state of things prevents the drift current from being so regular there, as in the heart of the trades.

Anomalies also take place in the great Equatorial Current, and in that of the S.E. trade. The former has been known, at one time, to run to the eastward, or directly opposite to its general, and as is commonly understood, perpetual course,—and at about the same rate; and with it, the whole mass of water from  $5^{\circ} N.$  to  $12^{\circ} S.$  At another time, a like anomaly took place between the parallels of  $2^{\circ} N.$  and  $7^{\circ} S.$  This latter was observed to take place at  $6^{\circ}$  or  $7^{\circ}$  to the eastward

of cape San Roque; but the other about midway between the two continents. In a third case, nearly in the middle, the current *ceased altogether*: or rather there was neither an easterly nor a westerly current. This happened in February; the other two in July and August.

Rennell generally gives instances, though none are adduced to corroborate the sweeping statement just made; but he says that in August, 1816, Sir James Yeo found *no current* between the Equator and Lat.  $1\frac{1}{2}^{\circ}$  S., from the meridian of Greenwich to Long.  $15^{\circ}$  W.; although four other persons have experienced from 22 to 68 miles per day in the same month, and also in February and April.

Captain G. Chevely, in June, 1830, when on the Equator in Long.  $40^{\circ}$  W. found the current setting N.N.E.  $1\frac{1}{2}$  miles per hour.

The French corvette *Diane*, September 1823, when near Long.  $45^{\circ}$  W. between Lat.  $6^{\circ}$  and  $4\frac{1}{2}^{\circ}$  N., was set to the eastward between 2 and 3 knots an hour during 2 days; on approaching *nearer* the mouth of the Amazon she had a westerly set of  $1\frac{1}{2}$  miles an hour.

From the log. of the French ship *Colosse*, Rear-Admiral Jurien:—June 8th to 11th, 1821, from Lat.  $1^{\circ} 35'$  N., Long.  $41^{\circ} 23'$  W. to Lat.  $4^{\circ} 21'$  N., Long.  $44^{\circ} 38'$  W. the currents were successively S.  $7^{\circ}$  W. 38m., S.  $45^{\circ}$  E. 32m., S.  $73^{\circ}$  W. 38m.

From the log. of the French ship *Thetis*, Captain the Baron de Bougainville:—From May 3rd to 9th, 1824, Lat.  $0^{\circ} 35'$  N., Long.  $28^{\circ} 17'$  W. to Lat.  $5^{\circ} 8'$  N., Long.  $28^{\circ} 49'$  W. the currents were successively N.  $64^{\circ}$  E. 22m. in two days, S.  $83^{\circ}$  E. 23m., N.  $28^{\circ}$  E. 4m., West 4m., and N.  $71^{\circ}$  W. 6m.

From the log. of the French ship *Lyonnaise*, Lieut. Lartigue, October 11th to 25th, 1825, the currents in the area comprised between Lat.  $6^{\circ} 32'$  and  $3^{\circ} 26'$  N., Long.  $38^{\circ} 10'$  and  $85^{\circ} 46'$  W. were successively N.  $48^{\circ}$  E. 20m., N.  $17^{\circ}$  W. 12m., N.  $57^{\circ}$  W. 25m., N.  $6^{\circ}$  W. 81m. in 3 days, N.  $12^{\circ}$  W. 51m., N.  $2^{\circ}$  E. 40m., N.  $6^{\circ}$  W. 12m., N.  $30^{\circ}$  E. 26m., N.  $72^{\circ}$  E. 34m., N.  $73^{\circ}$  E. 29m., N.  $38^{\circ}$  E. 18m., and N.  $32^{\circ}$  W. 25m.

From the log. of the French brig *Aigle*, bound from the coast of Guinea to the Antilles, in 1847:—

November 9th.—Lat.  $0^{\circ} 3'$  N., Long.  $16^{\circ} 50'$  W.; current N.E. by E. 7 miles per day.

November 10th.—Lat.  $0^{\circ} 40'$  N., Long.  $19^{\circ} 41'$  W.; current N.N.W. 15 miles.

November 11th.—Lat.  $1^{\circ}$  N., Long.  $25^{\circ} 3'$  W.; current N.  $\frac{1}{2}$  W. 17 miles.

November 12th.—Lat.  $1^{\circ} 57'$  N., Long.  $26^{\circ} 30'$  W.; current N. by W. 22 miles.

November 18th.—Lat.  $3^{\circ} 46'$  N., Long.  $28^{\circ} 53'$  W.; current N.N.E.  $\frac{1}{2}$  N. 4 miles.

November 14th.—Lat.  $5^{\circ} 8'$  N., Long.  $30^{\circ} 28'$  W.; current N.W. by N. 4 miles.

November 15th.—Lat.  $6^{\circ} 15'$  N., Long.  $31^{\circ} 7'$  W.; current E. by N. 4 miles.

November 16th.—Lat.  $7^{\circ} 1'$  N., Long.  $31^{\circ} 2'$  W.; current E.  $\frac{1}{2}$  N. 23 miles.

November 17th.—Lat.  $8^{\circ} 57'$  N., Long.  $33^{\circ} 52'$  W.; current S.E. by E.  $13\frac{1}{2}$  miles.

November 18th.—Lat.  $10^{\circ} 47'$  N., Long.  $85^{\circ} 0'$  W.; current East.

November 19th.—Lat.  $11^{\circ} 53'$  N., Long.  $37^{\circ} 53'$  W.; current S.E. 7 miles.

November 20th.—Lat.  $12^{\circ} 51'$  N., Long.  $41^{\circ} 25'$  W.: current N.  $\frac{1}{2}$  W. 10 miles.

November 21st.—Lat.  $13^{\circ} 46'$  N., Long.  $44^{\circ} 38'$  W.; current N.E.  $1\frac{1}{2}$  miles.

November 22nd.—Lat.  $14^{\circ} 23'$  N., Long.  $47^{\circ} 45'$  W.; current North 1 mile.

November 23rd.—Lat.  $15^{\circ} 4'$  N., Long.  $51^{\circ} 15'$  W.; current N.W. by N. 14 miles.

November 24th.—Lat.  $15^{\circ} 48'$  N., Long.  $54^{\circ} 57'$  W.; current North 10 miles.

November 25th.—Lat.  $15^{\circ} 57'$  N., Long.  $58^{\circ} 10'$  W.; current N.E. by E. 15 miles.

From November 5th, in Lat.  $0^{\circ} 2'$  S., Long.  $5^{\circ} 5'$  W., until Guadaloupe was

made on the 27th the set by current was N. 30° E. 144 miles,—giving a mean rate of 6½ miles in 24 hours.

The following is the substance of a paper read at the Royal Geographical Society, January, 1868.

"In this paper is given an account of the voyage of the brigantine *Monte Christo*, from Cayenne, in French Guayana, to Parahiba in Brazil, in July and August, 1862, from which the author considers that the current was at that time reversed in a most unmistakeable manner. The departure was taken from "Ile la Mer," one of the islands known as "Remire," off Cayenne, on the 26th; the wind blowing east, with which a direct northerly course was made until the 30th, when the position of the ship was 7° north, and in the same longitude as Cayenne. On this date the wind changed to the south and continued to blow from that quarter to the S.S.W. until the 7th of August. when the ship's position by dead reckoning was 42° 14' W., and an Austrian ship that was spoken, gave the position as 27° W. It was not discovered until some days after, when a second ship was spoken, that the latter was the actual position. From this it appears that for eight consecutive days the *Monte Christo* was drifted at the rate of 4½ knots an hour in an E.S.E. direction, diametrically opposite to the usual flow of the stream. Throughout the remainder of the voyage, extending over a further period of 14 days, the same current was experienced. The Captain of another ship, the *Loyal*, which came into Parahiba some days after, having a chronometer on board, had abandoned his observations believing his chronometer to be out of order. Also while sailing on board the French man-of-war steamer *Alecton*, from Surinam to Cayenne, the author met with the same phenomenon, leaving little room for doubt that the current was reversed throughout, and for a considerable time."\*

"The East India ship *Britannia* and *King George* transport were wrecked on the Roccas at 4 a.m., November 2nd 1805, when the current set at the rate of 2½ knots to the westward."

From the log of the French frigate *Circé*, Captain Duplessis Parscau, 1823 :—

May 6th.—Lat. 11° 23' S., Long. 81° 50' W.; current N. 85° W. 32 miles; wind S.S.E. to E.S.E.

May 7th.—Lat. 8° 4' S., Long. 81° 30' W.; current S. 77° W. 32 miles; wind S.S.E. to E.S.E.

May 8th.—Lat. 6° 14' S., Long. 83° 50' W.; current W. 9 miles: wind S.S.E. to E.S.E.

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\* This statement must be received *cum grano salis*; that the *Monte Christo* experienced an easterly current in the region and at the period of the year mentioned is very probable and there is nothing new in the fact; but we must decline to accept the rate;—there are but very few instances of such a velocity of current, and these are either where the stream of tide unites with the general current near the coast, or where the water is jammed into a very narrow passage—none such in the open ocean. The *Monte Christo* evidently had no chronometer on board,—*query*, were any amplitudes or azimuths taken to verify the courses made good?—D.R. carried on from day to day without any rectification is a very unsafe basis on which to determine the rate of a current; one of the old E.I. Co. ships in running from a Brazilian port made the Roccas 2° 12' east of Fernando Noronha, equivalent to a westerly current of 216 miles; another made an island on the west coast of Sumatra and supposed she was just south of the Maldivhs; we do not suppose D.R. is more carefully kept now than it formerly was.

May 9th.—Lat.  $3^{\circ} 46' S.$ , Long.  $35^{\circ} 57' W.$ ; current N.  $72^{\circ} W.$  25 miles; wind S.E. to E.S.E.

May 10th.—Lat.  $2^{\circ} 10' S.$ , Long.  $36^{\circ} 55' W.$ ; current N.  $76^{\circ} W.$  53 miles; wind E.S.E.

May 11th.—Lat.  $0^{\circ} 25' S.$ , Long.  $42^{\circ} 34' W.$ ; current N.  $77^{\circ} W.$  66 miles; wind E.N.E. to N.E.

May 12th.—Lat.  $0^{\circ} 51' N.$ , Long.  $45^{\circ} 24' W.$ ; current N.  $70^{\circ} W.$  93 miles; wind E.N.E. to N.E.

From the log of the French frigate *Amazon*, Admiral the Baron Roussin :—

October 20th.—Lat.  $3^{\circ} 53' S.$ , Long.  $27^{\circ} 51' W.$ ; current S.  $85^{\circ} W.$  33 miles; wind E.S.E.

October 21st.—Lat.  $1^{\circ} 11' S.$ , Long.  $27^{\circ} 41' W.$ ; current W. 23 miles; wind S.S.E.

October 22nd.—Lat.  $1^{\circ} 4' N.$ , Long.  $27^{\circ} 41' W.$ ; current W. 31 miles; wind S.E.

October 23rd.—Lat.  $2^{\circ} 48' N.$ , Long.  $27^{\circ} 47' W.$ ; current S.  $45^{\circ} W.$  10 miles; wind N.N.E. to S.E.

From the log of the French frigate *Clorinde*, Captain the Baron de Mackau, 1828 :—

October 18th.—Lat.  $9^{\circ} 11' S.$ , Long.  $27^{\circ} 26' W.$ ; current N.  $70^{\circ} W.$  21 miles; wind E. to E.S.E.

October 19th.—Lat.  $6^{\circ} 36' S.$ , Long.  $27^{\circ} 23' W.$ ; current N.  $78^{\circ} W.$  14 miles; wind E. to E.S.E.

October 20th.—Lat.  $3^{\circ} 54' S.$ , Long.  $27^{\circ} 31' W.$ ; current N.  $81^{\circ} W.$  29 miles; wind E.S.E.

October 21st.—Lat.  $1^{\circ} 8' S.$ , Long.  $27^{\circ} 10' W.$ ; current N.  $81^{\circ} W.$  14 miles; wind E.S.E. to S.E.

October 22nd.—Lat.  $1^{\circ} 2' N.$ , Long.  $27^{\circ} 10' W.$ ; current N.  $88^{\circ} W.$  26 miles; wind E.S.E. to S.E.

October 23rd.—Lat.  $2^{\circ} 46' N.$ , Long.  $27^{\circ} 26' W.$ ; current S.  $63^{\circ} W.$  14 miles; wind E. to S.S.E.

From the log of the French surveying vessel *Lyonnaise*, Lieutenant Lartigue, 1825 :—

November 5th.—Lat.  $1^{\circ} 23' S.$ , Long.  $34^{\circ} 42' W.$ ; current W. 12 miles; wind S.E. to E.

November 6th.—Lat.  $2^{\circ} 39' S.$ , Long.  $34^{\circ} 42' W.$ ; current S.  $74^{\circ} W.$  21 miles; wind E. to E.S.E.

November 7th.—Lat.  $2^{\circ} 57' S.$ , Long.  $34^{\circ} 28' W.$ ; current S.  $73^{\circ} W.$  22 miles; wind E.S.E. to E.N.E.

November 8th.—Lat.  $1^{\circ} 51' S.$ , Long.  $33^{\circ} 28' W.$ ; current S.  $71^{\circ} W.$  10 miles; wind E.S.E. to S.E.

November 9th.—Lat.  $1^{\circ} 8' S.$ , Long.  $32^{\circ} 6' W.$ ; current N.  $14^{\circ} W.$  16 miles; wind S.E. to S.S.E.

November 10th.—Lat.  $1^{\circ} 55' S.$ , Long.  $32^{\circ} 30' W.$ ; current N.  $45^{\circ} W.$  17 miles; wind S.E. to E.S.E.

November 11th.—Lat.  $2^{\circ} 29' S.$ , Long.  $32^{\circ} 28' W.$ ; current N.  $24^{\circ} W.$  18 miles; wind E.S.E. to S.E.

November 12th.—Lat.  $3^{\circ} 14' S.$ , Long.  $32^{\circ} 42' W.$ ; current N.  $59^{\circ} W.$  21 miles; wind S.E. to E.S.E.

November 13th.—Lat.  $8^{\circ} 49' S.$ , Long.  $32^{\circ} 45' W.$ ; current W. 21 miles; wind S.S.E. to E.

November 14th.—Lat.  $5^{\circ} 11' S.$ , Long.  $32^{\circ} 46' W.$ ; current S.  $79^{\circ} W.$  18 miles; wind E. to E.S.E.

November 15th.—Lat.  $6^{\circ} 38' S.$ , Long.  $32^{\circ} 59' W.$ ; current S.  $76^{\circ} W.$  8 miles; wind E. to E.S.E.

November 16th.—Lat.  $7^{\circ} 44' S.$ , Long.  $34^{\circ} 28' W.$ ; current N.  $50^{\circ} W.$  36 miles; wind E. to S.E.

December 4th.—Lat.  $7^{\circ} 19' S.$ , Long.  $32^{\circ} 11' W.$ ; current S.  $75^{\circ} W.$  82 miles; wind E.S.E. to S.E.

December 5th.—Lat.  $4^{\circ} 49' S.$ , Long.  $31^{\circ} 27' W.$ ; current S.  $68^{\circ} W.$  31 miles; wind S.E.

December 6th.—At Fernando Noronha, current N.  $69^{\circ} W.$  30 miles; wind S.E. to E.S.E.

December 8th.—Lat.  $3^{\circ} 55' S.$ , Long.  $33^{\circ} 20' W.$ ; current N.  $76^{\circ} W.$ ; wind S.E. to E.S.E.

December 9th.—Lat.  $4^{\circ} 19' S.$ , Long.  $35^{\circ} 46' W.$ ; current N.  $86^{\circ} W.$  29 miles.

December 10th.—Lat.  $3^{\circ} 50' S.$ , Long.  $38^{\circ} 6' W.$ ; current N.  $84^{\circ} W.$  32 miles.

From the log of the French frigate *Thetis*, Commander Baron de Bougainville, 1824:—

April 27th.—Lat.  $7^{\circ} 52' S.$ , Long.  $31^{\circ} 16' W.$ ; current S.  $60^{\circ} W.$  17 miles; wind E. to E.S.E.

April 28th.—Lat.  $5^{\circ} 51' S.$ , Long.  $30^{\circ} 43' W.$ ; current N.  $80^{\circ} W.$  20 miles; wind E.S.E.

April 29th.—Lat.  $4^{\circ} 19' S.$ , Long.  $30^{\circ} 4' W.$ ; current N.  $84^{\circ} W.$  25 miles; wind E.S.E. to S.E.

April 30th.—Lat.  $2^{\circ} 34' S.$ , Long.  $29^{\circ} 5' W.$ ; current N.  $76^{\circ} W.$  21 miles; wind S.E.

May 1st.—Lat.  $0^{\circ} 48' S.$ , Long.  $29^{\circ} 8' W.$ ; current N.  $71^{\circ} W.$  18 miles; wind E.S.E. to E.

May 2nd.—Lat.  $0^{\circ} 6' N.$ , Long.  $28^{\circ} 28' W.$ ; current N.  $49^{\circ} E.$  20 miles; wind E.S.E. to N.E.

May 3rd.—Lat.  $0^{\circ} 35' N.$ , Long.  $28^{\circ} 17' W.$ ; current N. 8 miles; wind E.S.E. to S.E.E.

— From the log of the *Unicorn*, 1841:—

November 19th.—Lat.  $1^{\circ} 2' N.$ , Long.  $26^{\circ} 26' W.$ ; current W. by N. 61 miles.

November 20th.—Lat.  $0^{\circ} 24' S.$ , Long.  $27^{\circ} 3' W.$ ; current W.  $\frac{1}{4}$  N. 32 miles.

November 21st.—Lat.  $4^{\circ} 5' S.$ , Long.  $29^{\circ} 35' W.$ ; current W. 32 miles.

"In 1858, Commander J. H. Selwyh, in H.M.S. *Siren*, visited the Roccas, and states that the anchorage is fair and protected from the prevalent swell from N.E. to S.E., and, from its situation in the heart of a westerly current, which varies in force from one to two miles, and its comparative vicinity to the mainland, a lighthouse would be most valuable to the mariner, as a means of ascertaining his position with certainty."

"From registers deposited with the Meteorological Department of the Board of Trade between 1856 and 1865, of 42 ships passing from the North to the South Atlantic Ocean, within a distance of 30 to 40 miles East or West of the Roccas at various seasons of the year, it appears that 14 do not record whether they have experienced any current or not. One experiences 'a strong westerly current,' and was 'driven back.' The remaining 27 found currents of the following direction and rate.

11 vessels were set West;—4 of these from 48 to 24 miles, and the remaining 7, from 20 to 10 miles a day.

8 " " W.N.W.;—4 of these from 51 to 30 miles, and 4 from 20 to 21 miles a day.

5 " " W.S.W.;—3 of these from 48 to 30 miles, and 2 from 20 to 10 miles a day.

1 " S.W.;—40 miles a day.

2 " " North;—12 to 8 miles a day.

" The strongest of these 27 recorded currents were found in June, July, August and November."

These statistics (pp. 127-138) relating to the currents in the part of the Atlantic Ocean under discussion are more ample than have hitherto been collected together in an other work; and we think they are sufficient to dispel the illusion of any S.E.-ly current between the Roccas reef and the Equator.

#### GENERAL SUMMARY ON THE CURRENTS IN THE EQUATORIAL REGION OF THE ATLANTIC.

(1.) THE EQUATORIAL CURRENT—due to the combined influence of the earth's rotation on its axis and the drift of the S.E. Trade-wind—pursues its course steadily from east to west across the equatorial region of the Atlantic,—the great body of the stream in mid-ocean being, however, found south of the Equator. Advancing westward with increasing velocity—a velocity ever varying with the strength and persistence of the Trade-wind—and widening as it advances, its tendency to bifurcate is sensible long before it reaches the South American shores.

(2.) That portion of the current which has a West, and W.N.W. direction flows towards, and then along, the northern shores of Brazil, where it becomes known as the GUIANA CURRENT; it passes on each side of Fernando Noronha and the Roccas, at an average rate of from 1½ to 2 miles per hour.—here also its least rate is about 12 miles and its greatest 60 miles in 24 hours; more to the westward a velocity of 2 and 3 miles an hour is not uncommon.

(3.) As a natural consequence of the bifurcation of the Equatorial current by the easterly projection of the South American continent, a portion of that stream—but a small portion—known as the BRAZIL CURRENT, runs to the southward at some distance from the coast, *spreading* as it gets southing—so as to take the direction of the coast line (S.S.W.) in the offing, but S.S.E. to seaward. The rate of this current varies from 10 to 15 miles a day, decreasing in velocity as it advances to the south.

CURRENTS NEAR THE COAST:—Inside this off-shoot from the Equatorial current—between it and the coast of Brazil—there are *counter currents* which, in the main, take their direction from the prevalent winds,—and as these are at particular seasons, extremely variable, the currents are no less so. During the period of the strength of the N.E. monsoon—commencing in October—the current runs to the S.W., sometimes with a velocity of 25 to 30 miles a day; and this is especially the case off the salient projections of the coast, as at cape San Augustin, the Rio Doce, cape San Thomé and cape Frio—so that making Pernambuco or Bahia during this season due allowance must be made for the S.W.-ly set; but

the velocity of this current varies as the cause which produces it, and hence in November, December, and January it is generally weak.

During the S.W. monsoon this counter current is Northerly, attaining its greatest velocity in June and July, but at other times comparatively weak; to the south of cape Frio it is N.E.-ly, and takes a more Northerly direction as it passes Bahia and Pernambuco—in fact following the lay of the coast.\*

"(4.) Misconception has arisen relative to the *easterly current* which has occasionally been found in the parallels of  $9^{\circ}$  to  $2^{\circ}$  N.

"This *counter current* of the Equatorial stream has been traced to extend, at certain months of the year, from the meridian of  $53^{\circ}$  or  $50^{\circ}$  W. to that of about  $25^{\circ}$  W., and thus joining or forming a part of the well known Guinea current. It is seldom experienced to the southward of  $2^{\circ}$  N., and there are very few records of its being found on or to the southward of the equator: it must not, therefore, be confounded with the Equatorial Current, as before described, for on the meridian of the Roccas its southern edge may generally be expected to be found about 350 miles to the northward. The western limits of this occasional *easterly current* have been ascertained from numerous observations of French ships of war visiting Cayenne and the neighbouring ports, and discussed by the able French officers Lartigue and Montravel, and may be generally stated as existing between the meridians of  $53^{\circ}$  and  $40^{\circ}$  W. and the parallels of  $9^{\circ}$  and  $5^{\circ}$  N., where it has been found running at the rate of 80 miles a day in July, August, and September. Within these limits this counter current does not appear to be constant or certain in direction, a westerly current more generally prevailing.

"To the eastward of  $40^{\circ}$  W. part of this *easterly current* approaches nearer the equator, or to about  $2^{\circ}$  N., and decreases considerably in strength, until joining the Guinea current, where it increases again in velocity as it nears the African shores. Within these eastern limits it appears to run the strongest in the summer and autumn months; and East of  $30^{\circ}$  W. to be generally constant during the year. Between the meridians of  $30^{\circ}$  and  $20^{\circ}$  West and the parallels of  $8^{\circ}$  and  $4^{\circ}$  N. it has been found to run from 30 to 15 miles a day."†

It is probable that this *occasional easterly current* is strongest and most prevalent during the strength of the S.W. monsoon in the North Atlantic—between June and October; although it has been reported in May and November. During the other months of the year, the drift of the N.E. Trade-wind reaches the equator, and at the time when the drift from the S.E. Trade-wind is least in volume, tends to augment the Equatorial current.

At the same time we cannot refrain from remarking that the currents as stated to exist are so *opposite* in direction, and there are such whirls within two or three days, that we believe much of this must be attributed to errors arising, as we have already said, from the impossibility of keeping a good D.R., where the wind is often all round the compass, and when at times the vessel has but little steerage way; besides it will scarcely be questioned that in the region of variables the *stream of air tends more to the eastward than to the westward*, and in

\* Les Côtes du Brésil, Description et Instructions nautiques, par M. Ernest Mouchez, Capitaine de frégate. 1864.

+ Hydrographic Notice, "Atlantic Ocean—Currents near the Equator;"—the excellent remarks in this notice were published during February (1866) to dissipate the same illusion as this article is bent on doing.

passing from North to South, or from South to North, the ship makes more easting than is generally thought or reckoned. It would be well if every vessel in H.M.'s service were strictly enjoined to make special trials for the current when crossing this region.

#### IV.—THE WINDS NEAR THE EQUATOR AND THENCE SOUTHWARD TO LAT. 20° S.—

##### WITHIN 500 MILES OF THE EAST COAST OF SOUTH AMERICA.

By reference to several of the journals already given it will be seen mention is frequently made of the direction of the wind, but the following is the most complete analysis yet published:—

**Winds on and near the Coast of Brazil.**—From 120,000 observations collected by Vice-Admiral Chabannes, of the Brazilian Navy, we obtain the following results respecting the direction of the winds for every month of the year, on the 33rd and 38th westerly meridian; in the former case the observations extend from the Equator to 20° S., in the latter between 10° and 20° S.

January: Long. 33° W.: from S. 40° E. near the Equator, to N. 69° E. in Lat. 20° S.

January: Long. 38° W.: from S. 78° E. in Lat. 10° S. to N. 62° E. in Lat. 20° S.

February: Long. 33° W.: from S. 41° E. near the Equator, to N. 79° E. in Lat. 20° S.

February: Long. 38° W.: from N. 87° E. in Lat. 10° S. to N. 58° E. in Lat. 20° S.

March: Long. 33° W.: from S. 50° E. near the Equator, to N. 82° E. in Lat. 20° S.

March: Long. 38° W.: from S. 85° E. in Lat. 10° S. to N. 76° E. in Lat. 20° S.

April: Long. 33° W.: from S. 52° E. near the Equator, to N. 83° E. in Lat. 20° S.

April: Long. 38° W.: from S. 64° E. in Lat. 10° S. to S. 76° E. in Lat. 20° S.

May: Long. 33° W.: from S. 48° E. near the Equator, to S. 74° E. in Lat. 20° S.

May: Long. 38° W.: from S. 58° E. in Lat. 10° S. to S. 77° E. in Lat. 20° S.

June: Long. 33° W.: from S. 39° E. near the Equator, to S. 79° E. in Lat. 20° S.

June: Long. 38° W.: from S. 61° E. in Lat. 10° S. to S. 70° E. in Lat. 20° S.

July: Long. 33° W.: from S. 41° E. near the Equator, to S. 63° E. in Lat. 20° S.

July: Long. 38° W.: from S. 50° E. in Lat. 10° S. to S. 86° E. in Lat. 20° S.

August: Long. 33° W.: from S. 44° E. near the Equator, to S. 85° E. in Lat. 20° S.

August: Long. 38° W.: from S. 59° E. in Lat. 10° S. to S. 82° E. in Lat. 20° S.

September: Long. 33° W.: from S. 39° E. near the Equator, to N. 86° E. in Lat. 20° S.

September: Long. 38° W.: from S. 70° E. in Lat. 10° S. to N. 89° E. in Lat. 20° S.

October: Long. 33° W.: from S. 38° E. near the Equator, to N. 71° E. in Lat. 20° S.

October: Long. 38° W.: from S. 85° E. in Lat. 10° S. to N. 85° E. in Lat. 20° S.

November: Long. 33° W.: from S. 38° E. near the Equator, to N. 63° E. in Lat. 20° S.

November: Long. 38° W.: from N. 79° E. in Lat. 10° S. to N. 69° E. in Lat. 20° S.

December: Long. 33° W.: from S. 36° E. near the Equator, to N. 58° E. in Lat. 20° S.

December: Long. 38° W.: from N. 78° E. in Lat. 10° S. to N. 52° E. in Lat. 20° S.

V.—IS THE EASTERN, MIDDLE, OR WESTERN ROUTE ACROSS THE EQUATOR THE MOST ADVANTAGEOUS, SO AS TO BE IN THE BEST POSITION WHEN THE SOUTHERN TROPIC IS REACHED?

An analysis of log books will give the best answer :—

Of Dutch ships \* that crossed the Equator east and west of Long. 25° W. we have the following results :—

Of 105 vessels crossing W. of Long. 25° W. :—

	Crossed Equator in	Mean.
Jan., Feb., March .....	26° W. ...	25.2 days.
April, May, June.....	28° W. ...	30.4 „
July, August, Sept.....	27° W. ...	34.0 „
Oct., Nov., Dec. ....	28° W. ...	27.3 „

Of 583 vessels crossing E. of Long. 25° W. :—

	Crossed Equator in	Mean.
Jan., Feb., March .....	22° W. ...	30.1 days.
April, May, June .....	23° W. ...	31.6 „
July, August, Sept.....	21° W. ...	33.1 „
Oct., Nov., Dec. ....	24° W. ...	30.7 „

For the English vessels on the *Western route* we have the following details :—  
*January, February, and March* :—from the log books of 33 vessels :—

The *mean position* of the vessels north of the Line was 26° 10' W. in 16° 15' N. : they were occupied 7½ days sailing from 10° N. to the Equator, which they crossed in 23½° W. ;—making the passage from the Channel to the Line in 29 days.

*April, May, and June* :—from the log books of 78 vessels :—

The *mean position* of the vessels north of the Line was 26° 35' W. in 14° 5' N. : they were occupied 8½ days sailing from 10° N. to the Equator, which they crossed in 24° 36' W. ;—making the passage from the Channel to the Line in 29 days.

*July, August, and September* :—from the log books of 204 vessels :—

The *mean position* of the vessels north of the Line was 26° 50' W. in 14½° N. : they were occupied 10½ days sailing from 10° N. to the Equator, which they crossed in 22° 25' W. ;—making the passage from the Channel to the Line in 33½ days.

*Oct., Nov., Dec.* :—from the log books of 99 vessels :—

The *mean position* of the vessels north of the Line was 26° 40' W. in 13° 5' N. : they were occupied 11½ days sailing from 10° N. to the Equator, which they crossed in 25° 50' W. ;—making the passage from the Channel to the Line in 34½ days.

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\* These instances are taken from “Maandelijksche Zeelanwijzingen van het Kanaal naar Java”; those in the following table from various sources: the English ships are from abstract log books in our possession.

For the English vessels on the *Eastern route* the details are as follows:—  
*January, February, and March*;—from the log books of 48 vessels:—

The *mean* position of the vessels north of the Line was  $22^{\circ} 36' \text{ W.}$  in  $4^{\circ} 48' \text{ N.}$  they were occupied  $8\frac{1}{2}$  days sailing from  $10^{\circ} \text{ N.}$  to the Equator, which they crossed in  $22^{\circ} 48' \text{ W.}$ ;—making the passage from the Channel to the Line in  $30\frac{1}{2}$  days.

*April, May, and June*;—from the log books of 33 vessels:—

The *mean* position of the vessels north of the Line was  $22\frac{1}{2}^{\circ} \text{ W.}$  in  $7^{\circ} \text{ N.}$ : they were occupied  $10\frac{1}{2}$  days sailing from  $10^{\circ} \text{ N.}$  to the Equator, which they crossed in  $23^{\circ} 6' \text{ W.}$ ;—making the passage from the Channel to the Line in  $29\frac{1}{2}$  days.

*July, August, and September*;—from the log books of 30 vessels:—

The *mean* position of the vessels north of the Line was  $23^{\circ} \text{ W.}$  in  $9^{\circ} \text{ N.}$ : they were occupied  $9\frac{1}{2}$  days sailing from  $10^{\circ} \text{ N.}$  to the Equator, which they crossed in  $21^{\circ} 36' \text{ W.}$ ;—making the passage from the Channel to the Line in  $30\frac{1}{2}$  days.

*Oct., Nov., Dec.*;—from the log books of 51 vessels:—

The *mean* position of the vessels north of the Line was  $22\frac{1}{2}^{\circ} \text{ W.}$  in  $12^{\circ} 6' \text{ N.}$ : they were occupied  $12\frac{1}{2}$  days sailing from  $10^{\circ} \text{ N.}$  to the Equator, which they crossed in  $24^{\circ} 18' \text{ W.}$ ;—making the passage from the Channel to the Line in 33 days.

Of the English ships,—taking the *western route*, the shortest period was 19 days; the longest, 46 days. For the *eastern route*, shortest period, 19 days; longest,  $43\frac{1}{2}$  days.

The Dutch ships show a gain of 4 days by crossing the Equator west of Long.  $25^{\circ} \text{ W.}$  from October to March, the difference between  $30\cdot4$  and  $26\cdot3$  days; while all alike average  $32\cdot3$  days from April to September. On the *westerly route* the shortest passages are in February, 22 days; the longest in August and September, 37 days. On the *easterly route* the shortest passages are made in December and January, 27 days; the longest in September,  $34\cdot7$  days.

The late Admiral Fitzroy, in *Meteorological Papers*, No. II., says—"When bound southward across the Atlantic Equator, under sail only, it is advisable to make the *eastern* or in-shore passage, near Africa, from November to May; and to take the *western* crossing, between  $23^{\circ}$  and  $32^{\circ} \text{ W.}$  from June to October."

The Dutch on the other hand say, that while the winds always are more or less favourable on the *western route*, vessels can with greater advantage take the *eastern route* during June, July, August, September, and October, when the S.W. monsoon in the North Atlantic will place them in good position for crossing the Equator to the eastward.

PERIOD OF THE YEAR.	English Ships.				Dutch Ships.				American Ships.				Average of the Three Nations.			
	West of C. Verdes.		East of C. Verdes.		West of C. Verdes.		East of C. Verdes.		West of C. Verdes.		East of C. Verdes.		West of C. Verdes.		East of C. Verdes.	
	No. of Ships.	No. of Days.	No. of Ships.	No. of Days.	No. of Ships.	No. of Days.	No. of Ships.	No. of Days.	No. of Ships.	No. of Days.	No. of Ships.	No. of Days.	Total Ships.	No. of Days.	Total Ships.	No. of Days.
Jan., Feb., March,	38	29-0	48	30-3	48	31-5	31	34-5	28	30-3	8	28-7	99	30-3	37	31-2
April, May, June,	78	29-0	88	29-8	110	31-3	36	32-5	37	29-2	8	31-0	225	29-8	77	31-1
July, Aug., Sept.,	204	33-6	80	30-5	122	34-6	17	35-7	34	32-8	7	35-7	360	33-7	34	34-0
Oct., Nov., Dec.	99	34-8	51	33-0	66	34-4	30	33-8	17	30-3	11	30-3	182	33-2	32	32-5
Average days from March to October	232	31-3	68	30-2	232	32-9	53	34-1	71	31-0	15	33-3	585	31-9	179	32-6
Average days from October to March	132	31-9	99	31-6	109	32-9	61	34-1	40	30-3	19	29-7	281	31-8	131	31-9
Average days	414	31-6	162	30-9	341	32-9	114	34-1	111	30-6	34	31-5	866	31-8	310	32-2

The Hydrographic notice already alluded to (*note p. 130*), says ;—as the *best meridian for crossing the equator by outward bound ships*, still appears to be an unsettled question among navigators, and as it is connected with the subject of the Equatorial currents referred to above, it may be of interest to seamen to append the following tabular statement, showing where each of the 930 ships (the registers of which are with the Meteorological Department of the Board of Trade) made their crossings; it being observed that all these ships were bound from British ports either to or round the Cape of Good Hope, round Cape Horn, or to some port of South America, southward of Bahia, between 1855 and 1865:—

*Meridians of crossing the Equator.*

	East of 20° W.	20° to 22° W.	22° to 24° W.	24° to 26° W.	26° to 28° W.	28° to 30° W.	30° W. and Westward.						
Jan .....	3	...	5	...	9	...	21	...	15	...	22	...	10
Feb.....	5	...	6	...	7	...	12	...	13	...	4	...	2
March.....	7	...	8	...	11	...	21	...	17	...	8	...	2
April .....	7	...	12	...	25	...	12	...	11	...	2	...	2
May .....	1	...	8	...	12	...	19	...	16	...	15	...	4
June .....	0	...	2	...	8	...	11	...	24	...	22	...	10
July .....	3	...	12	...	8	...	18	...	23	...	9	...	26
August ...	17	...	10	...	11	...	15	...	19	...	5	...	11
Sept. ....	15	...	10	...	7	...	12	...	20	...	8	...	7
October ...	2	...	9	...	6	...	11	...	22	...	17	...	16
November	0	...	3	...	1	...	10	...	17	...	32	...	29
December	2	...	1	...	3	...	9	...	21	...	12	...	10
930 ships	62	...	86	...	108	...	171	...	218	...	156	...	129

It is impossible, without a more rigid analysis than has yet been bestowed on this question of crossing the Equator, to determine with precision the best meridian. It is certain that it must vary according to the seasons, and perhaps the months; and as will be seen by a few examples appended, the evidence of the advantages of the more Easterly route contrast favourably with the extreme Westerly route.

Until, however, the various conditions attending the size, class, and speed of the ships, the favouring circumstances or otherwise of veins of wind, or calms, and other local conditions are duly allowed for and include a large number of ships extending over several years, it appears reasonable to assign weight to the practical results afforded in the above tabular statement.

One fact is observable in compiling this statement, *viz.*, that of the 930 ships, 808 passed 100 miles or more to the eastward of the Rocas, and thus to the eastward of Fernando Noronha.

Examples of the number of days occupied by *Sailing* ships in reaching the equator in different meridians and at different months of the year from among the 930 ships quoted:—

In January and February, 3 ships of 609, 614, and 1126 tons respectively, crossed the equator in 21°, 24½°, and 32½° W., and are respectively 21 days from Greenock, 22 days from the Start, and 23 days from Liverpool.

In March, April, and June, 4 ships of 964, 898, 1041 (deeply laden), and 477 tons respectively, crossed the Equator in 21½°, 23½°, 24½°, and 28°, and are respectively 21½, 26, 31, and 34 days from Deal, Plymouth, Gravesend, and Liverpool.

In July and September, 3 ships of 1160, 1202, and 765 tons respectively, crossed the Equator in  $30\frac{1}{2}^{\circ}$ ,  $32\frac{1}{2}^{\circ}$ , and  $32\frac{1}{2}^{\circ}$  W., and are 20 $\frac{1}{2}$ , 38, and 42 days respectively from Scilly, the Downs, and Liverpool.

In November, 1855 and 1856, 2 ships of 1050 and 300 tons respectively crossed the Equator in  $31\frac{1}{2}^{\circ}$  and  $31^{\circ}$  W., and are 45 and 21 $\frac{1}{2}$  days in crossing the equator from Liverpool; the ship making the longest passage leaves Liverpool with a fair but light wind, which lasted with slight intermission to the N.E. trades, which were also light; this ship was 14 days from  $6^{\circ}$  N. to the Equator.

To the foregoing we add the following illustrations to the same effect:—

In May, 4 ships crossed the Equator in  $23^{\circ}$ ,  $25^{\circ}$ ,  $27^{\circ}$ , and  $30\frac{1}{2}^{\circ}$  W., and were respectively 25, 21, 21, and 23 days from off the Eddystone.

In June, 4 ships crossed the Equator in  $22^{\circ}$ ,  $24^{\circ}$ ,  $27\frac{1}{2}^{\circ}$ , and  $31^{\circ}$  W., and were respectively 31, 25, 25, and 34 days from off the Eddystone.

In July, 6 ships crossed the Equator in  $19^{\circ}$ ,  $22\frac{1}{2}^{\circ}$ ,  $24^{\circ}$ ,  $26\frac{1}{2}^{\circ}$ ,  $29\frac{1}{2}^{\circ}$ , and  $31^{\circ}$  W., and were respectively 29, 26, 24, 29, 28, and 24 days from off the Eddystone.

In 1854, 5 ships were in lat.  $10^{\circ}$  N. in the middle of July; they crossed the Equator in  $20^{\circ}$ ,  $22\frac{1}{2}^{\circ}$ ,  $23^{\circ}$ ,  $24\frac{1}{2}^{\circ}$ , and  $25\frac{1}{2}^{\circ}$  W., and were respectively 30, 26 $\frac{1}{2}$ , 25 $\frac{1}{2}$ , 36, and 30 days from off the Eddystone.

In August, 4 ships crossed the Equator in  $18\frac{1}{2}^{\circ}$ ,  $21^{\circ}$ ,  $25^{\circ}$ , and  $27^{\circ}$  W., and were respectively 29, 26, 29, and 29 days from off the Eddystone.

In 1854, 4 ships were in lat.  $10^{\circ}$  N. on August 18th and 19th; they crossed the Equator in  $17\frac{1}{2}^{\circ}$ ,  $19^{\circ}$ ,  $23^{\circ}$ , and  $24\frac{1}{2}^{\circ}$  W., and were respectively 34 $\frac{1}{2}$ , 22, 34 $\frac{1}{2}$ , and 43 $\frac{1}{2}$  days from off the Eddystone.

In September, 4 ships crossed the Equator in  $19^{\circ}$ ,  $22^{\circ}$ ,  $24\frac{1}{2}^{\circ}$ , and  $28^{\circ}$  W., and were respectively 22, 26, 27, and 27 days from off the Eddystone.

In 1856, 5 ships were in lat.  $10^{\circ}$  N. at the end of September; they crossed the Equator in  $19\frac{1}{2}^{\circ}$ ,  $24\frac{1}{2}^{\circ}$ ,  $24\frac{1}{2}^{\circ}$ ,  $25^{\circ}$ , and  $27^{\circ}$  W., and were respectively 38, 29 $\frac{1}{2}$ , 30 $\frac{1}{2}$ , 39, and 39 $\frac{1}{2}$  days from off the Eddystone.

In November, 4 ships crossed the Equator in  $24^{\circ}$ ,  $30^{\circ}$ ,  $30^{\circ}$ , and  $31^{\circ}$  W., and were respectively 23 $\frac{1}{2}$ , 19, 22 $\frac{1}{2}$ , and 24 days from off the Eddystone.

In December, 5 ships crossed the Equator in  $23^{\circ}$ ,  $24^{\circ}$ ,  $25^{\circ}$ ,  $26^{\circ}$ , and  $29^{\circ}$  W., and were respectively 32 $\frac{1}{2}$ , 36 $\frac{1}{2}$ , 24, 21, and 32 days from off the Eddystone.

Maury recommends the *western* crossing of the Equator in all seasons, which of course is very advantageous for vessels bound round the Cape from American ports; but the policy of going so far west as Las Roccas is very questionable, and it is quite certain that in *many* instances as much as 10 or 14 days have been lost in clearing the Brazilian coast.

In crossing the zone between  $10^{\circ}$  N. and the Equator, experience will most probably prove that neither the extreme eastward nor the extreme westward route should be adopted—though much depends on the month; nor is it ever advisable, under any circumstances, when bound from the Channel, to cross the Equator to the westward of  $30\frac{1}{2}^{\circ}$  W.

Any attempt to take the route *through* the Cape Verde group inevitably results in making a long passage to the Equator.

Not to multiply instances in which a far westward route has resulted in failure—and of which we could furnish many—we give the following:—

An Aberdeen clipper bound to Australia crossed the Equator, 1857, June 17th in Long.  $32^{\circ} 20'$  W.; on 30th in Lat.  $4^{\circ} 46'$  S. sighted the land and tacked; July 2nd in Lat.  $6^{\circ} 5'$  S. sighted the land again and tacked; July 5th at 8 a.m. sighted

San Augustin distant 8 miles at noon in Lat.  $8^{\circ} 9' S.$ ,—when she made a fair start.

Since the publication of the previous remarks (p. 126-136) on the currents in the vicinity of the Roccas, we have received through the kindness of the Hydrographer the following "Bottle Paper," which had been forwarded to the Admiralty by H.M. Consul at Pernambuco:—

"This paper was thrown overboard from H.M.S. *Lee* on the 26th December, 1865, in Lat.  $9^{\circ} 10' S.$ , Long.  $12^{\circ} 53' W.$ , on the passage from St. Helena to Ascension. It was found on the following 5th February, at a village on the coast of Brazil called Praias or Arcias, in the province of Ceará, which is in Lat. about  $4^{\circ} 20' S.$ , Long.  $28^{\circ} 50' W.$ " The bottle travelled therefore in a direct line W. by N. 1590 miles in 132 days, or at the rate of 12 miles a day, and must have been passing the vicinity of the Roccas about the time the *Duncan Dunbar* was lost, and is strongly confirmatory of the Westerly Equatorial current.

We had hoped to be able to make some additional remarks about the easterly current *North of the Equator*, experienced by the *Monte Christo* (see p. 135) but the log books have come to hand too late; we know of some vessels that crossed her track, and, from the casual glance we have had of their journals, can say they make no mention of any strong *easterly current*, and were therefore justified in saying her report must be received with caution.

Much stress has been laid on the value of Maury's Sailing Directions as a guide for the *westerly crossing* of the Equator,—let us see what he does really say—although it must be remembered his observations appertain to American ships rather than those from Europe.

"I have not yet found a single case, in which there has been, after crossing the Line as far as  $32^{\circ}$ , the least difficulty in clearing cape San Roque. Navigators should not hesitate, if they are pinched, to go inside of Fernando Noronha, but in doing that they should take care not to run foul of the Roccas, Lat.  $3^{\circ} 51' S.$ , Long.  $33^{\circ} 47' 7'' W.$  I have the track of one vessel that dashed on, crossed the Line in  $41^{\circ}$  on the 19th day out, and on the 32nd day was south of the parallel of Rio. This, though, was in the winter and spring, when vessels can afford to keep to the westward, but it was going further west than I should advise.

"Suppose a vessel to cross in  $32^{\circ}$  or  $33^{\circ}$ , and to get the S.E. Trades at S.E.; by standing on S.S.W., she keeps herself in a position in which any change of wind is favourable. If it haul to the eastward, she can lay up and clear the land; if it haul to the southward, she can go about and make easting, and get along rapidly by stretches upon long and short legs.

"For the guidance of navigators who follow the new route, and are pinched in clearing cape San Roque, as they no doubt will occasionally be, I repeat the following suggestions:—From the Line, in Long.  $33^{\circ}$ , cape San Roque bears S.S.W. From this crossing place, in a smart ship that will fetch where she looks, a S.E. wind all the way from the Line would just prevent the vessel from clearing. But the chances are more than a hundred to one that the wind will not hang steadily at S.E. all the way from the Line to cape San Roque. If it haul to E.S.E. you can lay up and clear; if it haul to S.S.E. you can put about and make easting. But suppose the wind holds steadily at S.E. or at any other point which will prevent you from clearing the cape; draw a line from your place on the chart to the cape, and avoid falling to the west of that line, by taking advantage of slants,

or by beating accordingly as you may have the wind, and making long and short stretches."\*

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## BRAZIL BANKS.

**BRAZIL BANKS.**—Off the eastern coast of Brazil there is a series of shoals outside the Abrolhos, some of which have been wholly and others but partially explored. These banks are probably of the same nature as the Abrolhos, and have deep water between them; they are also so very steep-to, that after striking the ground at a depth more or less considerable, the lead may at the next cast fail to reach the bottom, although sounding in a depth of 150 to 200 fathoms. The bottom of the sea off this part of the coast appears to be very uneven, giving one the idea of peaks of mountains separated by wide and deep valleys; hence there is considerable difficulty in finding the shoals, even after having struck upon them, but this difficulty may perhaps be lessened when a more complete examination shall have been made of them. A survey of the banks would reveal their extent, and establish accurately their position; and it might perhaps be found that they would afford a valuable means to vessels of verifying their observations, as well as indicate their exact situation in reference to the land: it is therefore to be hoped that a long time will not elapse before the task is undertaken.

The Brazil banks appear to be distinct shoals, unconnected with each other. Of their number, extent, and nature, we have but a very imperfect knowledge; the only banks that have been examined being the Hotspur and the Victoria: these were surveyed by Captain Denham, R.N., in 1852.

The most northerly shoal is one of 22 and 25 fathoms, situated about 60 miles from the shore, in latitude  $16^{\circ}$  S. The portion examined appeared to be about 15 miles in extent, from S.S.E. to S.E., when it suddenly deepened to 60 fathoms, and soon afterwards all soundings were lost. It is probable that this is in reality the outer edge of the bank of soundings extending from the coast, as Captain De Roos, R.N., obtained a depth of only 17 fathoms between it and the land, in lat.  $16^{\circ} 5'$  S., and long.  $38^{\circ} 23'$  W.; and Captain Fitzroy, in the *Beagle*, 1832, passed outside it, in long.  $37^{\circ}$  W., and had no bottom at a depth of 100 fathoms.

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\* Captain Dumaresq, of the *Innisfail*, from Bahia, reports as follows:—"October 9th, sighted the Rocas reef, passed very close on the west side. Observed per bearings, in coming from the southward, that the reef is longer from East to West than reported in the Sailing Directions. It appeared at least about  $3\frac{1}{4}$  miles, and from North to South about 2 miles. Saw white bottom at about half a mile off the West end, but no breakers. A few trees were growing on the South islet, about 10 feet high, and were distinguished from aloft before the hut on the Northern islet could be seen about 10 miles off. I am of opinion that nothing of the reef could be seen on a fine night at a mile off, unless from the whiteness of the water on the reef and lagoon. A fine breeze at S.E. by E. was blowing at the time. Had very little westerly current from  $6^{\circ}$  S. to the line, say half a mile an hour." (1872).

*Fly Bank*.—This bank, the limits of which have not apparently been ascertained, is laid down on the chart on the authority of the "remark book" of H.M.S. *Fly*, 1823. The examined portion is 12 miles in length, extending from lat.  $16^{\circ} 48'$  to  $17^{\circ}$  S., and situated in long.  $96^{\circ} 10'$  W. The soundings obtained were 31 to 35 fathoms, when it deepened suddenly to 70 fathoms at the southern end of the shoal. The bottom consisted of coarse sand and gravel.

It is probable either that this shoal is very narrow, or that its position was not accurately determined; for H.M.S. *Sulphur*, in 1836, carried a line of soundings across its assigned position without obtaining bottom, although sounding in a depth of 200, 250, and 220 fathoms.

*Hotspur Bank*.—This bank is about 60 miles to the southward of the *Fly* bank, and it is supposed that there are no soundings between, as attempts have been made to reach the bottom with a line 250 fathoms long, but without success. The bank has obtained its name from a single sounding of 47 fathoms, obtained in 1814 by H.M.S. *Hotspur*. It has since been surveyed by Captain Denham, of H.M.S. *Herald*, 1852, and the following is a copy of his report.

"I shaped a course that should test the 47 fathoms, a single sounding laid down from the *Hotspur's* remark book, of 1814, in lat.  $17^{\circ} 56'$  S., long.  $36^{\circ} 4'$  W.; thence through the position assigned to some 38 fathoms by the *Montague* in 1813, lat.  $20^{\circ} 9'$  S., long.  $36^{\circ} 26'$  W. ;\* and then to trace if any submarine relation thereto could be shown with the bank associated with the names of *Padora*, 1847, and *John Adams*, 1849. Obtaining quicker soundings as we approached the assigned position of the *Hotspur*, our casts jumped suddenly from 200 fathoms, no bottom, to 27 fathoms coral; which, being 7 miles in advance of the 47 fathom spot, at once gave rise to an idea that the bank might cover a considerable space with perhaps shoaler water. No time was lost in taking up an anchorage upon it. The atmosphere favoured our morning, noon, and evening observations, so that latitude and longitude were satisfactorily obtained. It blew sufficiently moderate from N.E. to detach the boats, and before the swell disturbed us we obtained sufficient to show that we anchored upon a steep-to bank of coral—extending 14 miles N.W. and S.E., and 10 miles in a N.E. and S.W. direction, with as little as 25 fathoms on the middle of it, and which deepened suddenly from 30 fathoms to 70, and 200 fathoms without bottom. We could not detect the slightest current nor discoloration that would indicate so abrupt a feature in ocean water, by ripple or otherwise. The lead brought up a few specimens, but the dredge and anchor brought up nothing, and the fishing lines were very successful. We determined the latitude of the N.W. extreme of this bank to be  $17^{\circ} 51' 30''$  S., and the longitude, with subsequent rates at Rio,  $36^{\circ} 5' 9''$  W., and the variation  $6^{\circ} 33'$  W."

*Busbridge Bank*.—This bank is marked on the chart on the authority of the *Busbridge*, 1792, the master of which is stated to have obtained soundings of 30, 32, and 33 fathoms, coral. The position assigned to the bank was lat.  $18^{\circ} 36'$  S., and long.  $35^{\circ} 55'$  W.; and it does not appear that its limits were ascertained. It has not been examined since its discovery.

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\* In the Admiralty chart of the coast of Brazil, some soundings by the *Montague* are laid down in the same latitude,  $20^{\circ} 9'$  S., but long.  $36^{\circ} 20'$  to  $36^{\circ} 40'$  W. Perhaps it is the same bank as that referred to by Captain Denham; it differs, however, widely in longitude.

*Jaseur Bank*.—This bank is in lat.  $20^{\circ} 34'$  S., and long.  $35^{\circ} 48'$  W. The authority is H.M.S. *Jaseur*, which is stated to have obtained soundings in 1825 of 32, 35, and 38 fathoms, sand and coral. The extent and perhaps the correct position of the shoal have yet to be ascertained.

*Victoria Bank*.—This shoal was examined in 1853 by Captain Denham, R.N., and its position, as well as extent, correctly ascertained. Like the other banks we have been describing, it proved to be of coral formation, and very steep-to. The following is a copy of Captain Denham's remarks.

"Pursuing our search for the Montague shoal, at 9 miles further eastward than it was reported, we struck it in 31 fathoms, from a long line of 180 fathoms with the deep-sea lead and no bottom. We were forty-eight hours buffeting with a south-easter before we could obtain an anchor-hold of this bank, to which my attention had been specially directed. Eventually we occupied three positions on it; the *Torch* joined us, and we soon traced out a tolerably flat bank of 35 fathoms, bending to the south in its general direction from N.W. to N.E., 72 miles in length, and 12 in breadth, with one spot at its N.E. extreme of only 19 fathoms. We found a current to the S.W. of three-quarters of a mile per hour. The same description of fish as on the Hotspur were found in abundance. The swabs which we let down on it from different parts of the ship entangled some massive specimens, while the surface would yield nothing to the dredge or palm of the anchor. Our observations on this bank place it in lat.  $20^{\circ} 45' 8''$  S., long.  $37^{\circ} 47' 23''$  W. The variation (also adjusted for change of subsequently-ascertained deviation) came out  $3^{\circ} 42'$  W."

This bank had previously been sounded upon by Commodore Sinclair of the U.S. frigate *Congress*, in 1817, upon which occasion the depths obtained were 33 to 35 fathoms, the latter soundings being lost in lat.  $20^{\circ} 30'$  S., and long.  $37^{\circ} 30'$  W. More recently still, Commander Powell, of the U.S. ship *John Adams*, sounded upon it in 1849, and ran a distance of 43 miles across it in a S.W. direction. The position assigned to the bank by Commander Powell is nearly similar to that determined by Captain Denham.

*Pilot Bank*.—This bank is situated about 60 miles to the E. by N. of cape San Thomé, and the examined portion is about 15 miles in extent, in a N.E. and S.W. direction. The depth obtained was 9 to 15, 16, and 35 fathoms, sand and coral. It was discovered by H.M.S. *Pilot*, in 1843, and according to the observations then made, appeared to extend between latitudes  $21^{\circ} 38'$  and  $21^{\circ} 51'$  S., and longitudes  $39^{\circ} 35'$  and  $39^{\circ} 50'$  W.

Between this bank and the coast the ground appears to be very uneven, and perhaps there may be other banks yet undiscovered. In a previous part of this work, page 61, there is an account of a shoal of  $5\frac{1}{2}$  fathoms, said to have been discovered by the *Principe Imperial* when 25 miles from the land, to which reference should be made. The existence of this patch at so great a distance from the shore is doubted, still the uneven nature of the bottom hereabout entitles the statement to some consideration.

*Haile Shoal*.—The Haile shoal inserted in the charts southward of Rio Janeiro, in about lat.  $23^{\circ} 20'$  S., and long.  $43^{\circ} 10'$  W., is of very doubtful existence. The following account of it is from the *Nautical Magazine*, 1846:—"The ship I was in passed directly over a shoal, the position of which I do not see marked on any chart, bearing off the Sugar-loaf N.  $7^{\circ}$  E. (*true*), distance about 24 miles, extent about 200 yards in diameter. Bottom, sand and rock. There were no

soundings taken, but I should think there cannot be less than 8 fathoms over it."

**D'Elissalde Shoal**, on the north coast of Brazil.—This shoal was discovered by Lieut D'Elissalde, of the French gun-brig *La Vigie*, on March 1st, 1849, when beating up from Cayenne to Ceara. It is situated about 35 miles from the coast, in the direction of N.N.E. from the Rio Pernaibao, the estimated position of its south point being lat.  $2^{\circ} 17' 25''$  S., and long.  $41^{\circ} 52' 17''$  W. The depth just before hitting the shoal was 30 to 35 fathoms, when the lead suddenly struck the bottom in 11 fathoms, which soon afterwards increased to 13 fathoms. The shoal appeared to be 1 or  $1\frac{1}{4}$  miles in length, and no ripple or change of colour indicated its existence.

**Blaesdale Reef**.—This shoal is said to be on or near the Equator, in longitude about  $41^{\circ}$  W. The following extract from the log of the ship *Richard*, of Ulverstone, if it can be relied upon, would establish the certainty of its existence, although it was sought for unsuccessfully by Lieut. S.P. Lee, in 1852 :—

Captain Blaesdale says,—"Friday, 15th of October, 1819; fine moderate weather; ship going three knots; at 6h. p.m. grounded; did not remain fast above ten minutes. Water smooth: saw no breakers. In a few minutes after sounded, but got no bottom with 125 fathoms of line. Latitude at noon, by good observation,  $0^{\circ} 57'$  N. Run West until 6h. p.m. Long.  $41^{\circ} 22'$  W. The vessel drew 11 feet of water; in one hour there were 18 inches of water in the well. When the ship arrived at Para, whither she was bound, three holes were found, each about the size of a man's hat, and nearly through her bottom, and several large pieces of white coral were sticking in different parts."

Lieut. Lee spent four days in the search for this reef, and every effort was made to discover it, but unsuccessfully. In the position assigned to the rock, bottom was obtained at a depth of 2980 fathoms; and, to the distance of some miles from its supposed position, attempts to reach the bottom were made with a line 20 fathoms long, but without any result. A tide rip was observed to move off rapidly to the northward and eastward, and, singularly enough, the current was found to be one knot per hour in a direction of S.S.W., or opposite to the direction in which the tide rip was setting.

In 1854, a statement was made by a Captain Thompson, that he had recently passed over a shoal in Lat.  $0^{\circ} 30'$  N., and Long.  $41^{\circ}$  W. We do not place much credit in the statement because no particulars were added, nor did he attempt to reach the bottom with the lead. The position is near the supposed situation of the Blaesdale reef. Lieut. Lee's researches did not extend south of  $0^{\circ} 45'$  N.; but we think, from the deep soundings made by him *without touching the ground*, that no such shoal as that mentioned by Captain Thompson can exist.

**MANOEL LUIZ BANK**.—This is a dangerous coral shoal, similar in its nature and structure to the Abrolhos and other reefs on the coast of Brazil. It is situated about 77 miles N.  $8^{\circ}$  E. (*true*) from Itacolomi point at the entrance to Maranhao, and is so difficult to discover that it would really be an advantage if some means were adopted for marking it, such as by buoys or a floating beacon; for unless the sea is rough it does not break upon it, nor is there any indication of its existence except at very low tide. The shoal consists of many groups of conical patches of rock, nearly even with the water's edge, close to which there is frequently a depth of 8 and 10 fathoms, hence there is need of the greatest circumspection in approaching, and the lead ought to be kept constantly going while in its vicinity. Close to the edge of the bank there are 16 and 18 fathoms

water, and the rocky patches are separated by intervals irregular in distance and depth.

In calm weather the sea occasionally breaks upon the bank for an instant, and then, disappearing, leaves masses of white foam, which are visible for some time; this is, however, only at certain states of the tide, because, after two hours' flood, it is frequently the case that it is not visible even at the distance of half a mile. With a clear sky, the rocks under water may be seen at a short distance off, and appear as black thick patches; but this distance is too near for a vessel to approach in safety, therefore these indications of their vicinity ought not to be looked for. It should be remembered that many of the rocks are not more than 5 to 15 feet under the surface at low tide; hence a close approach, even in a calm sea, is not desirable.

The bank was partially examined by Baron Roussin in 1820, and judging from his survey, it is probable that no dangers exist in its vicinity in an East, South, and West direction: there is, however, some question whether there may not be a shoal north of it, a bank having been reported in Lat.  $0^{\circ} 32' S.$  by M. Da Sylva, an officer in the Brazilian Navy. It is to be regretted that, owing to the state of the weather and the limited time at his disposal, Baron Roussin was unable to carry his researches in that direction.

The examined portion of the bank is three miles in length from E. by S. to W. by N., and about half a mile across in a North and South direction. According to the observations of Baron Roussin in 1820, the position of his anchorage, at 400 toises (about 426 fathoms) south of the most westerly rock of the bank, was Lat.  $0^{\circ} 51' 25'' S.$ , and Long.  $44^{\circ} 14' 51'' W.$ \* The variation of the compass was  $0^{\circ} 57' E.$  It is high water on the days of full and change of the moon at 5h., and there is a rise and fall of the tide of about 12 feet. The tide sets regularly six hours each day, the flood to the S.W. and ebb to the N.E., with nearly the same strength, namely,  $\frac{1}{3}$  of a mile per hour. These remarks have been confirmed by others made by Lieutenant Lartigue, in a vessel named the *Lyonnaise*, in 1826, who found the alternate streams to run at the rate of nearly a mile an hour.

It is perhaps difficult to determine your distance from the Manoel Luiz bank by the soundings: the depth and nature of the ground at a certain distance from the danger being so variable, that only very unsatisfactory conclusions can be deduced from them. White sand, with black and red specks, is most common in that part of the sea between the meridian of the breakers of Coroa Grande and the eastern coast of the adjacent continent, and this bottom extends 10 or 15 leagues to the northward of the entrance to the bay of San Marcos: it is said,

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\* Baron Roussin adds, "All the accounts that I could collect of these rocks of Manoel Luiz agreed, in the midst of contradiction, in placing them more to the southward of the place in which I discovered them, and confined them to much narrower limits than those in which I found them; it was therefore most probable that I had seen them all. Nevertheless I do not affirm this; and our survey having included the approaches to these dangers in the directions the most important to vessels frequenting Maranhao, I am pleased to have solved the question of the actual position of this danger in its most essential parts, agreeable to the instructions given; leaving to a more favourable opportunity the chance of discovering whatever may be further interesting, for the benefit of navigation in general."

however, that these peculiar soundings are not without exceptions, soundings of a very different description being often found.

Beyond this distance of 10 or 15 leagues, as well as to the eastward of the meridian of Coroa Grande, soundings of sand and broken madrepora are most commonly met with. These soundings are very similar to those so constantly obtained along the coast from the Abrolhos. Baron Roussin had them at the extremity of all his routes to the eastward, also on the parallel of the Manoel Luiz bank, and thought it probable that they extended further to the northward and eastward. In fact, broken madrepora or coral is very common in the vicinity of the shoal,—that is, to the east, south, and west of it,—because the ground has not been examined north of it: it is, however, mixed sometimes, though rarely, with coarse gravel, broken shells, and rocks.

In the vicinity of the Manoel Luiz bank the depth varies so much that, as before observed, it is scarcely possible to judge by the soundings of your distance from the shoal, even to within 5 or 6 leagues. Baron Roussin when only 4 miles from it, sounded in 22 fathoms, and at the very next cast of the lead had but 10 fathoms water. The utmost caution should therefore be exercised when approaching, and a good look-out kept for the slight rippling of the surface that may perhaps indicate its position.

In the year 1872 a shoal was reported as existing in the middle of the channel between Manoel Luiz bank and San Joao islands, in lat.  $1^{\circ} 4' S.$ , long  $44^{\circ} 32' W.$  It has 5 fathoms water on it, is very steep on its north-west side, having 22 fathoms close to it. This shoal is in the usual track of vessels bound from Maranhao to the northward.

**Da Sylva Shoal.**—This is a shoal reported to have been discovered by M. Da Sylva, an officer of the Brazilian Navy. when running down the coast to Para about the year 1825. The position assigned to it was lat.  $0^{\circ} 32' S.$ , and long.  $44^{\circ} 17' 28' W.$ , which position is about 7 leagues to the northward of the Manoel Luiz bank. We are unable to say if this shoal exists, as Baron Roussin did not continue his examination of the bank of soundings northward of the Manoel Luiz, and there have been no attempts to establish its existence since its alleged discovery. Baron Roussin says, in reference to it,—“One question presents itself, and that is, to which of the two shoals, M. Da Sylva's or mine, ought we to give the name of Manoel Luiz? If former charts which notice this shoal are consulted, so little agreement is found among them, that it is impossible to decide in favour of one or the other. They are marked as only one group of rocks, and not any of them are placed in the position given either by M. Da Sylva or myself. I am therefore inclined to think that these two dangers ought to be considered as a continuation of the same shoal. Its extent, which would be 7 leagues north and south, having occasioned its being met with in many parts, will explain in some measure the different positions that have been assigned to it. I agree that this hypothesis would not justify all these accounts, because I am informed that the popular opinion at Maranhao, for example, places the shoal one degree more to the southward than where we found it, and where we are confident there exists no sort of danger; and we may say the same respecting the danger discovered by Da Sylva: however, it appears to me, beyond all doubt, that what is called the Shoal of Manoel Luiz, is only one of the points of the extensive shoal that M. Da Sylva and myself have fixed the northern and southern limits of.”

The following may perhaps be a confirmation of the view taken by Baron Roussin, that the Da Sylva shoal and the Manoel Luiz bank form one shoal. In

1817, a Captain Appleton reported a dangerous group of rocks in lat.  $0^{\circ} 45' S.$ , at about 4 leagues to the westward of the supposed position of the Manoel Luiz bank. The longitude was not mentioned; there is therefore some uncertainty as to the statement; but the latitude would place it about midway between the shoal seen by M. Da Sylva and that surveyed by Roussin. The rocks were of coral, sharp pointed, and had only 14 and 15 feet over them in some places. Close to them the lead sank into 40 fathoms.

**Le Huby Bank.**—This is a bank lying about 50 miles N.W. by N. from the Da Sylva shoal, in lat.  $0^{\circ} 4' N.$  and long.  $44^{\circ} 44' W.$ , as determined by chronometers. It is stated to have been discovered by Captain Le Huby, of the brig *Les Jumeaux*, in 1838; but this is an error, H.M.S. *Inconstant*, in 1817, having passed in the immediate vicinity of the position assigned to the bank, and found nearly the same depth of water. It should perhaps be called the Hewett bank, Captain Hewett, R.N., the commander of that vessel, having undoubtedly the merit of prior discovery; but as Captain Le Huby has given the first detailed account of it, we have preferred retaining his name in connexion with it.

Captain Le Huby says,—“I left Maranhao on October 3rd, 1838, at 2h. a.m., to proceed to Guadaloupe; and on the 1st of November, at 7h. 30m., the wind then being at East, slight breeze, fine weather, I perceived ahead a remarkable change in the water, which had become whitish or greenish, with a very short sea, seemingly rising and breaking in the direction of our track, which was then N. by W. We were surrounded by these rollers, and large patches under the water made me think that I was over some shoal, and gave me some uneasiness as to our position. At 8h. I sounded in 17 fathoms water, rocky bottom, continuing our route in the same direction, and under the same circumstances, the ship going two knots. I sounded again at 9h. in 19 fathoms, bottom of coral; at 10h. I found similar bottom with 21 fathoms; at 11h. I had 26 fathoms, same bottom; at 12h. 20m., when I observed the latitude, the depth was 29 fathoms; and at 10h. I sounded without finding bottom at 85 fathoms: the sea had now become quiet, and resumed its natural colour.

A good meridian altitude at noon gave for our position lat.  $0^{\circ} 4' N.$ ; the longitude by a good chronometer was  $44^{\circ} 44' W.$  It results from these observations that the shoal I had passed over extends from lat.  $0^{\circ} 9' S.$  to  $0^{\circ} 4' N.$ , in a S. by E. and N. by W. direction. From my observations in this part, the sea is much agitated, and breaks at intervals in the direction of N.W. and S.E. I think that it may be a part of the *vigia* of Manoel Luiz, and the breakers seen by Da Sylva. Without being able to assert that it may be a shoal enough for a vessel to ground on in parts, I think that it is dangerous to cross it in bad weather, on account of the heavy sea which may be met with. My first cast of the lead was 50 miles N.  $33^{\circ} W.$  from the Manoel Luiz bank, the position of which was determined by Baron Roussin.”

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# APPENDIX.

## GEOGRAPHICAL POSITIONS.

The Longitude of each of the following places, chiefly by M. Mouchez, is dependent upon the accuracy of that assigned to

**Rio Janeiro (fort Villegagnon) . . . . . 43° 9' 6" W.**

Those with an asterisk \* attached to them are from observations made on shore.

	LAT. S.	LONG. W.
Rio Grande do Sul (entrance)... ..	32° 7' 30"	52° 7' 49"
Reef near the point As Torres . . . . .	29 19 30	49 42 29
Cape Santa Marta . . . . .	28 38 0	48 49 57
Anatomirim Island (Santa Catharina)... ..	27 25 32	48 33 49
Cape Joao Diaz . . . . .	26 10 15	48 33 52
*Rio Janeiro (fort Villegagnon) . . . . .	22 54 31	43 9 6
*Rio Janeiro (imperial observatory) . . . . .	22 55 10	43 9 51
*Cape Frio (point and new lighthouse) . . . . .	23 0 42	41 59 37
Morro San Juan (2670 feet) . . . . .	22 33 10	42 3 49
Rio Macabé (entrance) . . . . .	22 23 0	41 46 59
Macabé Peak (about 6500 feet) . . . . .	22 13 0	42 7 19
Santa Anna Islands (the highest) . . . . .	22 25 30	41 42 49
Cape San Thomé (easternmost part) . . . . .	22 0 0	40 53 9
Cape San Thomé (the isolated house south- west of the cape) . . . . .	22 3 12	41 2 59
Sierre San Mathews . . . . .	21 48 0	41 44 49
Rio San Juan (entrance) . . . . .	21 38 0	41 1 42
Rio Itabapuna (entrance) . . . . .	21 18 45	40 53 19
Rio Itapemirim (entrance) . . . . .	20 57 40	40 47 9
Sierra da Onça... . . . .	21 35 10	41 32 19
*Ile Française (north-east point) . . . . .	20 55 0	40 44 33
Benevente (city) . . . . .	20 49 0	40 40 19
Morro Bahu . . . . .	21 21 45	41 24 29
Morro Orobo . . . . .	20 46 0	40 38 39
Morro Pero Cao . . . . .	20 37 0	40 32 49
Morro Mestre Alvaro . . . . .	20 9 0	40 18 32
*Espirito Santo Bay (convent Na. Ss da Pena) . . . . .	20 19 23	40 16 18

	LAT. S.	LONG. W.
Rio Magos Reis (south point of entrance) ...	19° 55' 10"	40° 5' 52"
Rio Doce (entrance) ... ..	19 87 10	89 48 7
Rio San Mateo (entrance) ... ..	18 87 40	89 40 19
*Rio Mucury (Port Alègre, entrance to the river)	18 6 15	89 82 45
*Barra Caravellas (the mast on the south point)	17 44 86	89 10 84
*Rio Prado (entrance)... ..	17 21 40	89 18 19
*Point Baleine (the mast) ... ..	17 41 84	89 8 28
Coroa Vermelha ... ..	17 58 0	89 12 89
*Abrolhos Island (lighthouse)... ..	17 57 51	88 41 22
*Comoxatiba (the village) ... ..	17 5 28	89 10 59
Point Corombao ... ..	16 52 15	89 7 9
Mont Pascoal ... ..	16 58 0	89 25 22
*Joassema (strand west of the cape) ... ..	16 44 0	89 7 54
Porto Seguro (church)... ..	16 25 40	88 89 84
*Santa Cruz (entrance to the river) ... ..	16 15 85	88 59 51
Rio Belmonte ... ..	15 51 10	88 25 89
Morro Commandatuba... ..	15 28 50	88 50 54
*Ilheos (entrance to the river) ... ..	14 48 80	89 1 49
*Contas (church) ... ..	14 17 40	88 58 55
*Camamu (strand of Barra Grande) ... ..	13 54 0	88 56 54
Point Castellanos ... ..	13 89 45	88 82 89
*Morro San Paolo (the lighthouse) ... ..	13 22 37	88 54 28
*Bahia (fort San Marcello or Mar) ... ..	12 58 16	88 80 44
*Pernambuco (fort Picao) ... ..	8 8 27	84 51 48
*Cape Branco ... ..	7 8 80	84 48 86
*Ceará (the church) ... ..	3 48 0	88 82 50
Maranhao (fort San Francisco) ... ..	2 80 0	44 18 89
*Para (quay of the custom-house) ... ..	1 26 56	48 29 28
Cayenne (fort) ... ..	4 56 28	52 20 12
*Fernando Noronha (the Pyramid) ... ..	8 50 30	82 25 80
*Las Roccas (north end of Sand island) ... ..	8 50 56	88 49 22

M. Eugène Penaud has also investigated the problem of the longitude of Rio Janeiro, and determined that of the Imperial Observatory of the city to be 3h. 1m. 55.2s. W. of Paris observatory or 43° 8' 39" W. of Greenwich, and Fort Villegagnon consequently in long. 43° 7' 49.5" W. According to M. Georges Fleuriat the cathedral at Monte Video is in long. 56° 11' 9" W. and the custom-house of that city in long. 56° 11' 19" W. These longitudes are the result of numerous observations made with very considerable care, and have been adopted by the Bureau of Longitude. The longitude of fort Villegagnon as originally determined by M. Mouchez was 43° 6' 51". The mean between his earlier and later determinations is 43° 7' 58" which nearly corresponds with the longitude ascertained by M. Penaud. See the *Connaissance des Temps*, 1870.

## WINDS, SEASONS, &c., ON THE COAST OF BRAZIL.

**Winds.**—The S.E. Trade is deflected from its course over the western part of the Atlantic by the American continent: between 10° S. and 20° S., (and westward of 30° W.) the Trade first begins to blow more easterly from October to December: the same tendency exists subsequently between the coast and the

20th meridian, from January to March. Again, over the space included between lat.  $20^{\circ}$  to  $30^{\circ}$  S., long.  $20^{\circ}$  to  $30^{\circ}$  W., at any season of the year the S.E. Trade will be lost there, for the reflection of the wind is not only unmistakeable, but calms are very prevalent; while between the same parallels and between the meridians of  $30^{\circ}$  and  $40^{\circ}$  the predominant winds are from N.E. and North, from October to March,—the S.E. Trade having then wholly disappeared, although it shows itself occasionally between April and September, blowing chiefly from the eastern horizon.

It is generally stated that on the coast of Brazil two Monsoons prevail—one northerly, the other southerly—and that there is a difference in the time of their appearance on the north and the east coast; but this is greatly exaggerated. Brazil extends through 38 degrees of latitude (from  $41^{\circ}$  N. to  $34^{\circ}$  S.), consequently there must be great diversity not only in the climate but in the quarter from which the winds blow at different periods of the year; but neither log books nor meteorological observations on land point to two distinctly marked Monsoons. On the north coast, the N.E. Trade must blow home while the sun is in the southern hemisphere; but as the sun approaches to or crosses the equator, the wind blows more easterly: so the S.E. Trade (more easterly) will also be felt during the time the sun is in the northern hemisphere. On the east coast, as far as  $10^{\circ}$  S., the S.E. Trade is the prevailing wind throughout the year, but blowing more easterly from September to March; southward of the 10th parallel, when the sun is in the southern hemisphere, the prevalent winds are from N.N.E. to East *i.e.*, towards and along the land, *from the north*; when the sun is in the northern hemisphere, the S.E. Trade is the prevailing wind from  $20^{\circ}$  S. to the equator—blowing between East and S.E., *i.e.*, towards and along the land, *from the south*. The remarks, therefore, of Baron Roussin—that the general classification of the winds into two Monsoons requires considerable modification—are quite correct; irregularity is the rule, not the exception, as an analysis of the different winds in the areas previously given clearly indicate. In the rainy season strong winds frequently blow from the south and west.

There are, along the coast, several local winds, rising to squalls and gales, against which it is necessary to guard; these are:—the Rebojos, or S.W. squalls of the rainy season, blowing for three or four days, when the sky is unsettled, but moderating when accompanied by rain;—the violent storms of short duration blowing from N. to S.W. by S., frequent off the coast of Maranhao during the rainy season, from February to May, accompanied by incessant thunder and lightning;—the Abrolhos squalls, frequent between May and August, when the season is wet;—the Terre Altos or N.W. squalls, in the vicinity of Rio Janeiro, lasting five or six hours;—and on the coast between cape Frio and Rio Grande do Sul very violent squalls and gales, similar to the *Pampero* of the Rio Plata, from S.E. to S.W., and occasionally from N.W., are experienced; they seldom, however, last more than a day or two, but blow at times very furiously.

Land and sea breezes are felt, more or less, along the whole coast of Brazil as in all tropical countries, but the latter wind is generally not only the stronger of the two, but blows longer, as must always be the case where the *Trade-wind comes from the sea*; then it is that the land breeze is feeble and of short duration—sometimes scarcely perceptible—so that vessels cannot depend on finding it.

**Seasons.**—At Para, Maranhao, and Ceara the rainy season commences in December or January; July is the period of transition from wet to dry, and the driest (or summer) months are from August to November, both inclusive; as

illustrative of the influence of position on the annual rain-fall, Maranhao, where 276 inches have been recorded, shows a striking contrast with Ceara, and the arid plains around it, where the draughts have occasionally been very severe. At Pernambuco, Bahia, and Rio Janeiro the rains commonly set in about March and last till August. At Santa Catharina the wet season is from July to October; and going southward the rainy season becomes more and more coincident with the austral winter, when it is likewise stormy. On the north coast, however, the rainy season is very variable as to the period at which it commences; and along both the north and east coast the rains are not constant to the rainy season, but fall occasionally in the dry season; the amount also varies considerably in different places and at different times. The reason may be readily understood—South America being situated under the sky of the tropics, and the plains of the north and east being open to the Trade-wind of the Atlantic, a copious supply of moisture is always secured to that continent. The plateau and mountain systems of Brazil and Guiana, elevated from 3000 to 6000 feet, do not rise high enough into the atmosphere to arrest the vapours of the ocean, which sweep unobstructedly and unceasingly across them: in fact, the only effect they have is to augment the falling showers and to supply a more copious irrigation. The Orinoco and the lower tributaries of the Amazon, the Paranahyba, the San Francisco and many other rivers flowing from those mountain systems, are evidences of this effect.

The *temperature* of various places along the coast of Brazil is as follows:—at Para, close to the Equator, as well as at Maranhao, the mean is about 76° at night to 84° in the day, sometimes it reaches 93°; at Ceara it ranges from 63° in the coldest to 95° in the hottest months; at Pernambuco it varies from 77° to 86°, with a slight decline in the rainy season; at Rio Janeiro the *mean* temperature of 30 years is stated to be 74°; at Santa Catharina the temperature descends to 54° in June and July (the winter); and at Rio Grande do Sul to 40° and 44° during the winter, and it rises to 88° in summer.

## CURRENTS ON THE COAST OF BRAZIL.

**The Atlantic Equatorial Current.**—This current commences in about 5½° E., and the island of Annabon (in lat. 1° 37½' S.) serves as a sea-mark to show the variability of its position; thus to the northward and eastward of that island the currents generally flow between north and east, but to the southward of Annabon they fluctuate between N.E. and W.N.W., while to the westward and N.W. of the island the Equatorial current is always found running W.N.W., but with uncertain velocity—generally from 15 to 24 miles in April and June. Gradually extending north and south, ranging between 8½° N. and 5° S., it flows at an average rate of 25 or 30 miles per day, as far as long. 12° or 14° W. by the side of the Guinea current running in an opposite direction—from west to east—and several degrees warmer than the Equatorial Current. Advancing westward with increasing velocity and the while continuing to spread, the equatorial stream sends off a branch towards the N.W. near the meridian of 20° W., which penetrates to 20° and 25° N. The main stream in its westerly progress becomes wider

and wider, and long before it reaches the American side shows its tendency to bifurcate by varying in direction between W.S.W. and W.N.W. Its velocity now is from 45 to 60 miles a day. That body of the stream which has a west and W.N.W. direction, flows towards, and then along, the northern shores of Brazil, becomes known as the Guiana Current, and passes *slowly* into the Caribbean sea and Gulf of Mexico. The W.S.W. branch gradually takes a more southerly divergence, and thus runs parallel with (but at a considerable distance from) the American shores as the Brazil Current. From the place where the Equatorial Current begins to spread out—with the tendency to bifurcation—the borders have a greater velocity than the central parts.

The average rate of this stream may be estimated at 45 miles a day; and taking the mean temperature of its waters, in the middle of the ocean, at 77° Fahr., it increases to the westward and diminishes to the eastward—4° or 6°.

An easterly current is frequently spoken of as being found on the northern border of the Equatorial Current; it extends between 50° W. and 25° W., and very rarely exceeds half a mile an hour. May not this be an eddy or counter current formed between the main equatorial stream and the N.W. branch sent off in 20° W.?

The *Amazon*, rising on the eastern slopes of the Andes, is the largest river in the world; pursuing a course for upwards of 3500 miles, it enters the Atlantic on the Equator. It is fed by upwards of 20 streams—each one a gigantic river—and is navigable 2000 miles from its mouth, where it is still 90 miles wide. It enters the ocean by an estuary 135 miles broad and 200 miles long, pouring out a dense volume of fresh water with such impetuosity that it passes over the Guiana current, and, “at a distance of 300 miles from the mouth of the river, has been found to have a velocity of 3 miles an hour, its original direction being but little altered, and the fresh water but partially mixed with that of the ocean.”

**The Brazil Current.**—When the Equatorial Current bifurcates off Cape San Roque, it flows to the southward as the Brazil current—commencing in 6° or 7° S., about 200 to 300 miles from the coast. Proceeding southwards, it spreads considerably; sends one branch along (but not near) the coast, which is occasionally felt (feebly) as far as the Straits of Magellan: the other branch (the larger of the two) takes a south-east and then an easterly direction, when it is known as the “connecting current,” which flows onwards—a part of it forming a kind of eddy current in the centre of the South Atlantic, and a part uniting with the Antarctic drift may possibly find its way *far* to the southward of the Cape of Good Hope. Very little is known respecting the Brazil current in any portion of its course, but it does not seem to have a greater velocity than about 20 miles a day at its starting point; this may arise from its impinging on the drift of the S.E. Trade. Inside the Brazil current, and within a distance of 200 miles of the coast, alternating and counter currents prevail—flowing sometimes in one direction, sometimes in another, dependent in a great measure on the winds. They generally run to the northward from March to September, and to the southward during the other months, but at all seasons they are much modified in direction by the form of the coast, by the set of the tides, and by a variety of other local influences. To the seaman who makes himself acquainted with them, they are considered of great service in navigating from port to port.

## PARA AND AMAZON RIVERS.

The information respecting the river Amazon, and its confluence, as also the river Pará, is principally furnished by Commander Bonham W. Bax, commanding H.M.S. *Sharpshooter*, August 1867 :—

**PARA RIVER.**—Vessels making the river should sight Atalaia point light (at which place a pilot for Pará can be obtained if wished), and then proceed to the westward at a distance of about 5 miles from the land, so as to make out each point in succession, and in not less than 6 fathoms water, until the breakers on the Braganza bank are seen and the white buoy on the north side of it made out, and then the red buoy on the east side of the Tajoca bank. By keeping away between the two buoys, and steering S.W.  $\frac{1}{2}$  S., both banks will be cleared.

In running for the entrance, allowance must be made for the tide running across the Braganza bank, which it does at the rate of 3 miles an hour.

By the aid of the above-mentioned buoys, and a mud bank about 7 miles from Pará and a  $\frac{1}{4}$  of a mile north of Nova island, (which by the chart appears as a bank with a  $\frac{1}{4}$  of a fathom water on it), having become an island with trees growing, the sailing directions for the Pará river are ample.

**Light.**—A lightvessel is moored in 15 fathoms at about  $1\frac{1}{4}$  miles northward of Braganza shoal, entrance of the river Para. It exhibits a *revolving white* light, elevated 30 feet above the sea, visible 8 miles. Position lat.  $0^{\circ} 25' 25''$  S., long.  $47^{\circ} 55' W.$

Ships coming from eastward should, as soon as the lightvessel bears West, steer for it, and passing north, steer S.W. as soon as they have rounded it.

A large buoy painted *white* lies in  $8\frac{1}{4}$  fathoms on the east side of Braganza shoal; it can be seen about 3 miles from a vessel's deck.

**Winds.**—During the dry season there is generally a good breeze right up the river, which makes it easy for sailing vessels, and they can work down with the tide.

**Anchorage.**—Should vessels require to anchor to wait for tide, &c., there is good anchorage in from 5 to 7 fathoms, mud and sand, on the meridian of Pombas island and also off Musqueiro point, in from  $3\frac{1}{4}$  to 5 fathoms with that point bearing North.

Vessels should not, unless compelled, bring up outside the reefs, as by so doing they would risk losing an anchor.

**Pozo Channel.**—The officer employed by the Brazilian Government in surveying the entrance of the Amazon, informed the writer that the Pozo channel is now seldom used, in consequence of its banks having altered and the tide sweeping across them with great velocity.

The *Main Entrance* to the west of cape Magaori is still too imperfectly surveyed for any but coasters, but when properly examined it will probably become the highway of the river, as it is much more direct.

The *West Entrance* is only used by fast steamers with a good pilot, on account of the danger arising from the Prororoca, or Bore, the water being then raised 30 or 40 feet in a few minutes, in two or three rollers, which carries all before them.

**Para.**—Vessels should moor within a quarter of a mile of the town in from 2 to 3½ fathoms; the depth of water at the wharf is 6 feet at low water. The city of Pará has increased greatly within the last few years, and has now many good and well built houses in the outskirts; it is well drained, the soil being clay and sand. The roads are good, well shaded with the Monjuba and Palm trees, and kept clean and in order. The dockyard has some fine buildings, but at present no work is going on; there is a gridiron for cleaning ships bottoms, capable of taking a ship of 600 tons and drawing 7 feet water; there is also a foundry in the city; many good shops and stores, kept by Brazilians and Portuguese, and three large British firms are established here.

The population in 1866 was 36,000, of which 5,000 were slaves, and the remainder principally Indians; they are well ruled and civilized.

**Steam Communication.**—The Amazon Company, receiving a subsidy of £140,000 per annum from the Brazilian Government which is to continue until the year 1877, owns eight steamers of about 600 tons each and drawing about 6 feet water; these steamers run as far as Manaós twice a month, once a month to Tabatinga on the frontiers, and twice a month to Rio de Janeiro.

The New York and Rio de Janeiro Company's steamers call at Pará on the 6th or 7th of each month.

A Liverpool company sends a steamer once a month, but not direct. The large subsidy granted to the Amazon company renders it difficult for other merchant ships to compete in the river trade, and it will probably continue so until the period to which the grant extends expires.

**Supplies** can be obtained at Pará, salt meat being five-pence per pound, fresh beef six-pence, and bread five-pence per pound.

**Water** is supplied to shipping by boats at a charge of six shillings a ton, but it is dirty and bad. The water from the river is sufficiently good for washing purposes, though not fit for drinking at this season of the year (August).

Foreign merchants labour under no disadvantage in trading.

**Exports, &c.**—The value of the exports in 1866 was nearly £800,000, of which £312,000 was conveyed in British vessels, consisting of rubber, cocoa, nuts, cotton, isinglass, and balsam. Imports in 1866 amounted to £510,000, consisting of beer, coals, cotton stuffs, and sundries. Shipping.—139 vessels entered in 1866, of which 60 were English, the whole tonnage being 17,500 tons.

**AMAZON RIVER.**—Permission is now given for vessels of war of foreign nations to go up the Amazon river, on written application to the President of Pará.

The usual route for vessels to proceed up the river is by the pass of Goyabal and Breves channel, which carries deep water right up; small steamers can go round the south end of Oncas island into the south branch of the Amazon, but large vessels, with the draught of water up to 16 feet, must proceed by the channel between Arrapiranga and Contêjuba island.

The flood tide is not felt far beyond Breves, although the water rises, (caused by the flood at the entrance checking the stream running out), so that it would be very tedious for a sailing vessel to attempt to get up far, the winds being so light and variable.

**Lights** have been placed by the Amazon Company as follows:—Contêjuba, south end;—Barra (north from Pará);—Paucuera, east side of entrance of Tocantins river;—Goyabal island, south end;—Intahy island, Breves channel;—and Guajara river entrance.

**Cametá.**—A vessel bound to Cametá, on the Tocantins river, after passing Paucuera light, must shape a course between the second and third islands, lying off the east bank near the entrance of the river, and between two other islands inside them, towards the east bank of the river, along which continue for about 18 miles in not less than  $4\frac{1}{2}$  fathoms water, (but generally in 7 and 8), then strike across S.W. to Cametá on the opposite bank, and anchor about  $1\frac{1}{2}$  cables off the town in 8 fathoms water.

Cametá, although containing only about 3000 inhabitants, is an important town, as the whole trade of 1600 miles of the river passes through it, the produce being brought down from the interior in small schooners and montarias; the town is dry, the river bank here being 20 feet high, and the soil composed of red clay and sand; deep water runs close to the shore, and there is every facility for the construction of wharves. The rise of the tide is 9 feet, and the velocity of the current about  $2\frac{1}{2}$  miles an hour. The water of the river at Cametá is good and fit to drink. Supplies can be obtained, beef being sixpence a pound.

The land being low and thickly wooded, its general appearance is so uniform that it is difficult to distinguish one particular part from another; it is therefore desirable to obtain a pilot, but on account of the little traffic there are few who can be trusted, excepting those employed by the Amazon Company, to take charge of a vessel drawing more than 6 feet water.

The district round Cametá contains a population of nearly 30,000, of which 5000 are slaves, the remainder chiefly native Indians, but there are many Brazilian and Portuguese families; the Indians lead a very simple life, and are peaceable and hospitable. The police system is good, and there is a school in every village, attendance being compulsory on penalty of a fine.

Cametá is healthy, except in the rainy season (December and January), when fever and ague prevail.

The principal article cultivated is cacao, which appears to grow almost wild; rubber is brought in from the country. The value of the exports in 1886 was £22,400 and the imports £6400.

Two steamers pass between Pará and Cametá regularly every month, and a small trading steamer occasionally.

It may be observed that if vessels were permitted to proceed straight to Cametá from the sea without having to call at Pará an advantageous trade might be established, as the southern entrance to the Amazon, after passing through the Tajoca channel, is easy until the mouth of the Tocantins river is reached, from whence a pilot is necessary.

**Navigation of the River.**—The Amazon itself is navigable for vessels of 1000 tons as far as Manáos 800 miles up, at the junction of the river Negro with the Amazon. Manáos is the most important town in the interior.

All the confluent can be navigated as far as the towns mentioned in the decree, viz. :—

Tocantins, as far as Cametá,	100 miles from Pará.
Topajoz, „ Santarem,	500 „
Maderia, „ Borda,	800 „
Negro, „ Manáos,	800 „

The population of Santarem is increasing rapidly by emigration from the Southern States of America.

**Climate.**—The climate is very hot (80 to 90 degrees of Fahrenheit), though the mornings are cool; the heat increases as the river is ascended.





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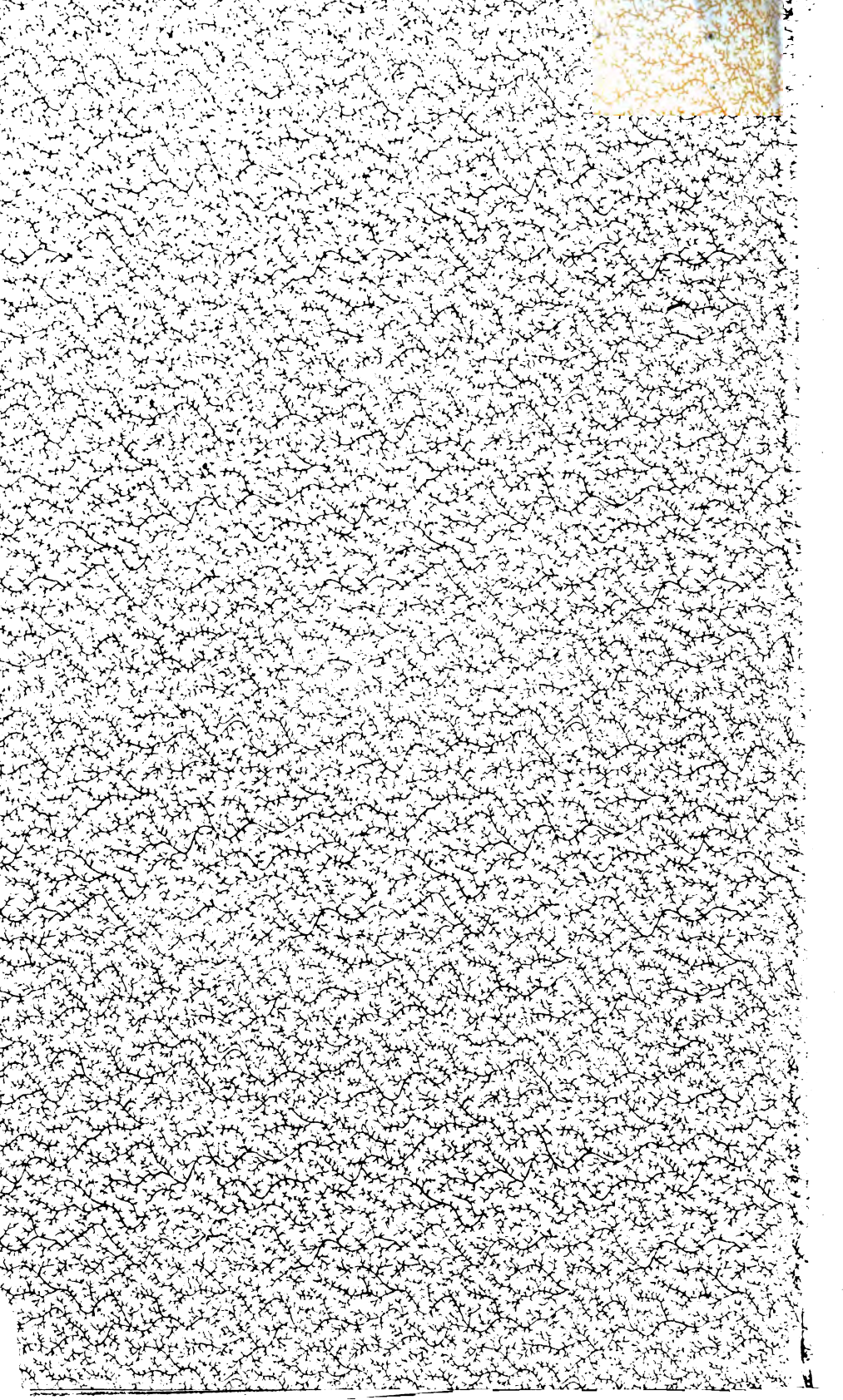
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